The

Electrical Review

VOL. CI. OCTOBER 21, 1927. No. 2,604.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

Chairman: H. ALABASTER

Technical Editor: A. H. ALLEN, M.I.E.E. *Joint Managing Directors:* G. H. ALABASTER. E. A. GATEHOUSE M.I.E.E., A.M.INST.C.E. *Commercial Editor:* A. H. BRIDGE.

Manager and Secretary: E. S. MIDDLETON.

OFFICE: 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "AGEKKAY, CENT., LONDON," Code, A B C. Telephone No.: Central 7872 (Three Lines).

The "Electrical Review" is the recognised medium of the Electrical Trades, and has by far the Largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d.; Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to THE ELECTRICAL REVIEW, LIMITED, and crossed "Midland Bank, Newgate Street Branch."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

Contents:

	PAGE
Domestic Electrification	657
Women in the Electrical Field	658
The Domestic Load Abroad	658
Electric Fires	658
Electric Cooking	658
Light, Heat, or Power?	659
The Overhead Lines Association	659
"For Health's Sake"	659
E.D.A.: A Bond for Better Business, by J. W. Beauchamp	660
The Electrical Age, by Lady Brooks	660
Power in the Home, by W. A. Shaw	661
The Retirement of Mr. Beauchamp	662
Three Years' Experience in an All-Electric House, by Prof. S. Parker Smith (*illus.*)	663
The Use of Electricity in the Homes of Canada, by A. S. L. Barnes	665
Domestic Electricity in South Africa, by E. Poole (*illus.*)	667
Electricity in the Swedish Home, by Alfred Ekström (*illus.*)	670
Ultra-Violet Rays in Therapeutics, by Chas. A. Cooper (*illus.*)	672
Modernising Radio Receivers, by W. James (*illus.*)	674
The Domestic Storage of Energy, by L. G. A. Sims (*illus.*)	675
Electric Fires for the Home (*illus.*)	677
Electric Cooking (*illus.*)	681
Domestic Electrical Water Heating (*illus.*)	685
Electric Lighting Fittings (*illus.*)	687
Selling Lines for Home and Export (*illus.*)	689
The Overhead Lines Association	695
Legal	695
Business and Industrial Notes	696
Lighting and Power Notes	699
Tramway and Railway Notes	701
Telegraph and Telephone Notes	701
Radio Notes	701
Contract Information	702
Forthcoming Events	703
Notes	703
Institution Notes	707
Our Personal Column	707
Financial Section—	
New Companies Registered	708
Official Returns of Electrical Companies	708
City Notes	708
Stocks and Shares	709
Correspondence—	
A Proposed Mains Engineers' Association	711
Employment Problems	711
Published Specifications	711
Trade Mark Applications	711
New Work for Contractors	712

Domestic Electrification.

WE should only be wasting words if we were to dwell at any length upon the great importance of the development of domestic electrical applications to the future of the industry. Everybody in our ranks knows it and many have shouldered responsibility and are whole-heartedly doing their duty.

The energy, thought and ingenuity of some thousands of electrical men and women are at this moment, and will be for some months to come, concentrated upon measures for hastening the electrification of the homes of Britain. That is the grand objective of this winter's campaign, and we hope that everybody electrical, whether a member of a Circle or not, will find some way of contributing to the success of the movement.

"An Englishman's Home is his Castle"—sometimes a place where the past is honoured and prejudices die hard—but whether it be a castle or a workman's dwelling, it is well worthy of organised attack by electrical forces; these, make their assaults with the most beneficent of intentions. They seek to demonstrate beyond dispute the ample service which electricity can render in the relief of life's burdens; how for all classes and characters of surroundings it can simultaneously simplify and beautify; how in the greater efficiency of illumination, the increase of comfort, the assurance of cleanliness and purity, the reduction of drudgery and the increase of leisure, it can demonstrate its welcome wizardry.

It is in order that we may do something beyond our ordinary weekly duty in helping those who are daily concerned with the electrical equipment of the modern home that we have devoted the greater part of this Domestic Electrification number of the ELECTRICAL REVIEW to various aspects of the subject. Our articles have been specially prepared for the instruction and practical use of those who intend to take advantage of the opportunity that another autumn and winter educational campaign presents for doing increased business in a most promising field, and if they bring us such ungrudging encomiums as our similar Special Issue of a year ago we shall feel gratified and shall know that we have rendered timely service to the trade.

Women in the Electrical Field.

A correspondent recently took exception to the incursion of women into the electrical field, on the ground that it would tend to restrict employment for men. With all due deference to him, we believe that his inference is directly contrary to the facts. Just as the extended use of overhead mains will inevitably increase the demand for insulated cable, so the enrolment of women as advocates of electrical development is certain to result in the wider adoption of electricity in the home and a better market for electrical appliances, calling for the employment of more men in the electrical industry. There are functions which cannot be performed by the average man with the same efficiency as by a woman; what housewife, for instance, will accept a mere man's assurance that electric cooking is more advantageous than any other method? A woman, on the other hand, can speak from personal experience, and knows exactly what points will appeal to the prospective customer.

Again, women realise that they stand to benefit immensely by the extensive adoption of electrical applications in the home, and in the interests of their sex they can be counted upon to further it by every possible means. An instance of such advocacy is afforded in this issue by Lady Brooks, C.B.E., who cogently points out the importance of wiring every new house, even though at the time of building there may be no electricity supply in the neighbourhood; hence architects and builders ought to be adjured to adopt this policy, electrical engineers should get into closer touch with them, and the Electrical Association for Women, of which Lady Brooks is a Branch President, should educate the architects' wives in order to convert their husbands!

Incidentally, we may point out that women are playing an active part not only in rural electrification, but also in house-building schemes, and can thus apply the principles which they so earnestly profess.

The Domestic Load Abroad.

Manufacturers who are endeavouring to develop their Colonial trade in domestic electrical appliances will find a good deal of useful information in the articles appearing elsewhere in this issue on the practical experience obtained in building up the domestic load in Canada and South Africa. In both cases the authors have compiled the material during the past few months expressly for Electrical Review readers, and we believe, whether statistical or critical, it can be turned to very good account. In Canada, it will be noted, cash prizes are being offered by the Canadian Electrical Association to electric light and power companies which show the greatest total sales of domestic appliances per lighting consumer during the year 1927-8, and it may be a revelation to some to learn that the British Columbia Electric Railway Co. is selling nearly $250,000 of domestic electric apparatus per annum. The "Red Seal" house-wiring movement is responsible for increasing business in the adequate wiring of houses, and United States appliances are being sold in Canada at less than U.S.A. prices, probably due to the American over-production which has lately been commented on here already. The Canadian article shows how the low charges for energy for domestic service have accelerated the rate of development, while the author of the South African contribution also emphasises the importance of low domestic tariffs, directs attention to the efforts that are being made to render electric water heating attractive, and passes on certain criticisms of British electric stoves which will no doubt receive due consideration from our firms. In a third domestic electric progress article, Dr. Alfred Ekström tells the story of what is happening in Sweden, where progress would, in his opinion, have been more rapid but for the joint municipal ownership of gas and electricity systems, the handing of electricity profits over to tax reduction rather than to the electricity consumer, and the rigidity or unadaptability of the municipal *régime* there.

Electric Fires.

One of the most timely articles in this issue is that upon "Electric Fires for the Home," for, in spite of the vagaries of the past summer, winter is still the heating season. It must be said in passing, however, that the sort of summer which we experienced this year provides a glorious opportunity for the electric fire to show its merits—its availability at a second's notice with no more trouble than the touching of a switch.

Last year and this, two circumstances have combined to enhance the popularity of the electric fire. First, the coal dispute which continued almost into the winter stimulated the demand for fuel-less heating apparatus, as the output figures of the manufacturers amply prove. Some manufacturers are able to report still further and continuously increasing demand for their particular types of fire, the volume of business done during the past six months being considerably in advance of that booked a year ago when the coal dispute was in progress. Secondly, the last two years have seen many more supply authorities introduce rates of charge conducive to the use of electric fires, so that in a large number of towns this form of heating compares (even in cost) favourably with coal and gas. We say "even in cost" for the apparent cost is only one item to be considered. A very large proportion of domestic labour is absorbed in the lighting and cleaning out of coal fires, to say nothing of the incidental effects which all provide additional work. As we have said before, we think that we have hardly made sufficient of such advantages as availability, convenience, cleanliness, and labour-saving merit. Consumers, however, find these to be excellent talking points in interesting their friends. Another very important aspect is the hygienic one. All these things offset the cost, and if they could be converted into a cash equivalent, electricity's supremacy would be unchallengeable.

Electric Cooking.

In spite of the advance which has been made in recent years in the design of the boiling plate of the ordinary electric cooker, both as regards efficiency and quick boiling, this vital portion still remains a drawback, particularly as regards quick boiling, when compared with similar apparatus used in other methods of cooking. This should not impede cooking by means of electricity. The electric kettle adequately fills the missing link; it is efficient and speedy. Most manufacturers recognise this, and advocate the electric kettle as an essential part of the ordinary cooking apparatus, or, in some cases, an electric water-heating system in conjunction with the cooking equipment. In the apparatus described by Dr. P. Parker Smith elsewhere in this issue the boiling plate, except for frying and ordinary pots, is replaced by plug-in electric boiling utensils.

Unfortunately there appear to be some supply undertakings still doubtful about pushing the kettle as a part of the household electric cooking apparatus, and it seems that on this particular point education of the supply authority is perhaps at least as urgent as it is for the public or the consumer.

It is not good business to attempt to hide the weak point, while the existence of the means (the electric kettle) of placing electric cooking ahead of other methods renders any attempt to do so little short of folly.

Engineers would do well to thoroughly grasp the fact that full advantage must be taken of the apparatus available in order to make electric cooking competitive, and any reluctance to admit that the electric cooker alone (without the kettle or other electrical means of hot-water supply) falls short of the best practice should be overcome immediately.

That the required electric boiling plate or its equivalent will be evolved is certain, but until such time as it is introduced, the electric kettle should be encouraged and, indeed, insisted on as necessary to complete the ordinary domestic electric cooking outfit.

Light, Heat, or Power?

An interesting case was recently brought before the Southend magistrates, which raises an old subject of contention in a new form. According to the *Morning Post*, the Corporation summoned a resident of Leigh for improperly using electricity; it was stated that he had two meters, one for lighting, at 6¼d. per kWh, and one for heating, at 2¼d. He charged a high-pressure wireless accumulator from the heating circuit, and a light was seen burning while this was being done—doubtless a lamp used as a resistance to limit the charging current to a suitable value. The summons was dismissed, on the ground that the Bench "had no illumination from the High Court."

Countless consumers of electricity are using this method of charging their small batteries, and as the load is essentially a long-hour one, with excellent load and diversity factors, it is, though small, clearly desirable from the supply authority's point of view, and is justly entitled to the lower price. Obviously, if every consumer installed accumulators for all purposes and charged them from the public mains, the supply authority would be on velvet, with a load factor far beyond anything attainable under present conditions—the lighting peak would disappear. It is to the interest of the supply authority, therefore, to encourage this use of electricity and to charge for it on the lower scale. To call it a lighting load is splitting hairs; where this short-sighted course is adopted, the consumer had better "hide his light under a bushel," use a lamp which does not emit light when passing the small charging current, or substitute some other non-luminous resistance.

The Overhead Lines Association.

As we confidenfly foretold, the meeting which was held at the Institution of Electrical Engineers last week decided to bring into being the "Overhead Lines Association"; it was attended by many of the engineers who have been doing their utmost to develop rural electricity supply in spite of the many harassing difficulties that they encounter, and a clear case was readily made out to justify the creation of a new body endowed with the strength which can only be derived from collective action, for the purpose of smoothing the way and cheapening rural electricity supply. Emphasis was laid upon the desire to co-operate with all other agencies which are working to this end—a policy which is, of course, inherent in the principle of collective action—and there was a consensus of opinion that the new Association could do work which did not fall within the scope of any other body. Hence, after an hour's debate, all tending in the same direction, the resolution constituting the "Overhead Lines Association" was passed without a single voice or hand being raised in opposition, and good progress was afterwards made towards determining the shape that the new body should take. It was agreed that the Committee or Council should not be elected at that meeting, but a small committee was appointed to choose a name for the Association, to nominate a number of engineers representing all parts of the country as candidates for the Council, and to make arrangements for the next general meeting, to which its recommendations would be submitted.

Letters continue to reach us warmly supporting the project, but in future they should be sent to the hon. secretary, Mr. Theodore Stevens, at 50, Lincoln's Inn Fields, London, W.C.2. One such letter points out that so far as the Overhead Line Regulations are concerned, any relief from unnecessary restrictions that is obtained in this country will also take effect abroad, for in the dominions the local regulations are based upon those which are in force at home, and protests levelled against anomalies and hardships which their enforcement entails, are met with the retort that there is no ground for complaint, as the rules objected to are taken from the British code! However, in India, at least, licensees (or undertakers) are not bothered much with regard to submitting vexatious details of proposed lines; once the method of construction has been approved, extensions are made as and when required, subject only to the lodgment of notice of intention to proceed, and a plan (but not details) of the line. The lines are subsequently officially inspected, and where the inspector is a practical, experienced man, the arrangement works smoothly and with very little delay.

Regulations, however, though they need purging of red tape and "absolute safety" requirements, are by no means the only obstacles to progress; probably the wayleave problem is the worst of all, and calls for drastic action. As stated in our "Notes" to-day, this will be the subject of discussion at the meeting which is to be held on November 2nd, and endeavours will be made to prepare a standard form which can be recommended to that meeting for adoption. At the following meeting overhead-line regulations will be discussed.

"For Health's Sake."

Although electricity has not much more than begun to win its way into the more intimate interests of human life, it has shown already that its potentialities for raising the general standard of health and happiness, and for ameliorating the lot of those who suffer, are remarkable, and there is every reason to hope that electro-medical, electro-surgical and allied developments may, as time goes on, render far more wonderful assistance to humanity in removing or lessening some of the ills to which our flesh is heir. Suspecting minds familiar with the literature advertising electric nostrums if they did not know that in actual experience, and free from the influence of the nostrum vendor and the charlatan, genuine electrical means for the relief of pain and disease were at their hands for the asking, might at first be inclined to discount the slogan "For Health's Sake use Electricity." But when they discover that it is the current slogan of the British Electrical Development Association and has its origin in the very real assistance that electricity is rendering in the everyday life of millions of people all the world over who are employing it for manifold purposes in their homes, all must admit the soundness of it and its value as a propaganda cry with the fullest backing of actual fact, truth and proof.

We question whether sufficient stress is laid by its advocates upon the fact that electricity does its work—lighting, heating, power, or whatever it may be—without emitting any noxious emanations or fumes either inside or outside the house: it neither consumes nor defiles the atmosphere, nor is it possible for it to contaminate food cooked by its agency. Moreover, it provides in the electric fan an ideal means of circulating the air, which has been shown to be even more necessary to physical comfort than perfect purity; and the ozone generator gives a freshness to the air which is obtainable from no other artificial source.

To the many invaluable and indispensable services rendered by electricity to the physician and the surgeon in case of illness or disease we hardly need refer—the splendidly equipped electrical department without which no modern hospital is complete speaks for itself; taking note here only of its applications in the home, we may cite the electric bed-warmer as the only means of maintaining a continuous and unvarying supply of heat, under accurate control, without labour or attention, and in recent years the use of the electrical vibrator, high-frequency treatment, and both thermal and ultra-violet irradiation has rapidly increased in popularity. Of the efficacy of these last aids to health there can be no question—they represent the artificial production in the home of conditions which Nature has provided liberally in more favourable climates, and so bring the health-giving properties of the Alpine sun into our smoky towns; and that reminds us that to all its other benefits electricity when used universally will add the elimination of the pall of smoke which cuts off the light and heat of the sun. Truly the slogan of the B.E.D.A. was well chosen.

E.D.A.: A Bond for Better Business.

The Circle Campaign.

By J. W. BEAUCHAMP, M.I.E.E.

THE President of the British Electrical Development Association, Sir James Devonshire, K.B.E., on Monday, October 3rd, launched the National Advertising Campaign which already promises a high water mark of co-operative efficiency in the history of this Association, which has grown so rapidly during the past eight years.

The prime object of E.D.A. work in the next six months is to increase the consumption of electricity in the homes of Britain and the business prosperity of all those in the electrical industry who contribute in any way to domestic electrification.

This Campaign, in addition, reflects more strongly than any of the preceding ones the policy of the Association, which is to bring together for mutual help all groups and ranks in the business and to do that by progressive decentralisation under Headquarters' direction.

The working of the 1926-27 Campaign was based upon many regional and district Committees, hurriedly called together and rather as a temporary measure to make that Campaign effective by multiplying the "push" and by giving to the direction of it the benefit of local knowledge.

That Committee and Circle movement has been successful beyond all expectations and the Circles have rapidly come into action again for the purpose of the new Campaign, while further ones have been empanelled.

The idea of launching the Campaign by means of an expression of thanks to the Press of the country and a message concerning electrification was a happy one, and resulted on one day and at the same hour in some two thousand people sitting at meat in different cities and towns of the country to assure the representatives of the Press that their efforts on behalf of electrical development had been appreciated and to tell them that the benefit of the great publicity organs they control would continue to be employed by the Association and the Industry in an increasing degree.

To the readers of the Electrical Review it is unnecessary in this brief note to refer to the many details of the E.D.A. Circle Campaign; particulars are in their hands, or they can be had on demand within a few hours.

The writer wishes, however, to express the earnest hope that the leading features: Demonstration Houses, so popular and valuable last year; the distribution of circulars and publicity matter, of which this Campaign offers some twenty newly-produced examples; and particularly the widespread adoption of the "All Electric Week" in December, will be supported in the fullest manner which circumstances and funds permit—even be supported a little more fully than circumstances and funds seem to permit. That such action will result in a gratifying increase of public interest in electrification and in profit-earning is certain.

So soon as we begin to book orders and carry out work resulting from this publicity effort, let us, so far as possible, keep the future in mind—sow in such a manner that we may continue to reap, lay additional cables on as generous lines as possible, provide consumers' installations, lighting and equipment of the best, not the barest outfit which immediate needs dictate, but something into which thought and design have been put, something a little more than the consumer thought he wanted. Often enough he will pay for it willingly and be pleased afterwards, given that little touch of trained and sympathetic salesmanship which comes ever more easily and naturally to the salesmen or saleswomen who are first themselves convinced that they are offering to the buyer something thoroughly worth while, something the benefits of which they themselves have experienced, and in the future of which they have a personal faith.

The Electrical Age.

Women welcome electricity as the key to freedom from household drudgery; the author appeals to architects and builders to realise this, and to exercise foresight by wiring all new houses.

By LADY BROOKS, C.B.E., J.P.,
President of the Birmingham and Midlands Branch of the Electrical Association for Women.

MOST people will agree that the more intelligent outlook is the scientific outlook. We have stepped into a scientific age, and this means a fuller age and yet a simpler age—an age of more right activities, and, therefore, an age of greater rest. This sounds contradictory, but in reality is not, for right activity means rest: it is only wrong activity that brings weariness, ennui, and fatigue. There is nothing so restful as the knowledge that one's activities are accomplishing definite results—sound results—productive results.

It is for this fundamental reason that women are welcoming with open arms the Electrical Age.

Our activities in the past have been so often false activities, lacking in intelligence, in economy, in happiness. Now we see before us the possibility of the expression of a greater intelligence, because of the opportunity that electricity is affording us for indulging in the study of the things that count in life—in other words, to possess a leisure unknown to our ancestors whose spare time had necessarily to be spent in household drudgery. This leisure in the past was supposed to be only for the moneyed classes, but to-day it is a right of the people, for the simple reason that, since the emancipation of women, there has hardly been such a thing as the leisured woman, for we realise that happiness comes from varied occupations and activities and can never be the product of forced monotonies. Drudgeries of the past that have been mulish in their stupidities are fast disappearing behind us, and electricity is the magic now within our reach. There is still, however, a long path to tread before this actual vision of a more intelligent freedom comes into being: and almost the first essential is closer co-operation between the electrical world and our architects and builders. This co-operation is vital if economy is to be effected and waste of labour avoided.

Building schemes are vigorous, and the Electricity Act is an accomplished fact, both embodying new

houses and new ideas—but the two must be welded together. We need the courageous and far-sighted architect and builder. We need our new houses equipped to be electric, when the country in the near future shall be a network of magic labour-saving wires.

We want to be saved the expense of wiring our houses anew, even though, at the time when the houses are built, there may be nothing electric within miles. The cost of wiring a house in the course of erection is nothing compared to that of wiring one already erected, and our builders and architects must wake up to this fact and make our new houses ready for us. They should adopt some such advertising phrase as: "No house designed or built unless wired for the promised electricity."

Electrical engineers, too, should help more by getting into closer touch with them at conferences and in their journals, for it is only with courage and co-operation that progress is made.

The E.D.A. is doubtless doing a splendid work, but could it not concentrate on a special campaign of enlightenment for architects and builders?

Municipal and educational authorities, too, could help very much in spreading the gospel, but this is perhaps where our Electrical Association for Women can co-operate and accomplish much good, for, after all, if our women think on these things, our men will be forced to do so sooner or later. Therefore, we must encourage the wives of our builders and architects to join our Association, so that they may convert their husbands. The blessing of the future will be upon their heads in the form of gratitude for their wisdom and foresight.

We women have come into the arena to render a public service, and we want our men-folk to realise this and support our efforts.

The world to-day is at an absorbingly interesting moment in history—the moment when it is experiencing the realisation that the co-operation and joint activities of man and woman are making a happier and a better world to live in.

Power in the Home.

The Need for "Safety First."

By W. A. SHAW, A.M.I.E.E., President of the Electrical Contractors' Association, Inc.

BECAUSE "domestic electrification" is pre-eminently the field of the electrical contractor, it affords me the greatest possible satisfaction to note that the Electrical Review continues to devote special attention to this important phase of our work. Few people will dispute the fact that the big domestic load carried at the present moment by our supply authorities has been built up, to a very large extent, by the activities of electrical contractors in "bread-and-butter" business all over the country; and it is equally true to say that electrical contractors never exhibited a more progressive spirit in this direction than is being displayed by the rank and file of the trade at the present moment.

Electrical contractors are playing a big part in E.D.A.'s domestic campaigns, and they are taking an ever-increasing practical interest in the activities of the Electrical Association for Women and other organisations whose activities are calculated to stimulate interest in the all-important question of domestic electrification. During the late W.O.B. Campaign, the number of "Electric Home" exhibitions organised by electrical contractors represented one of the most striking features of the whole effort, and I have reason to know that in the present Circle Campaign similar domestic exhibitions will be promoted and demonstrated by groups of progressive electrical contractors all over the country.

Such, undoubtedly, is the electrical spirit of the moment. Perhaps a little slowly, but none the less surely, all sections of the electrical industry are coming to realise the need to get together and work together for the common good. In many areas this spirit is actively aflame. Supply authorities, manufacturers, and contractors have come together; they have realised the folly of disjointed or opposing effort; they have appreciated that every section of the industry has its own peculiar difficulties; and they have sunk their minor differences in a genuine attempt to achieve the greatest possible good to the greatest possible number both of the public *and* the trade. In certain other areas this co-operative spirit may be less conspicuous, but who shall doubt that common sense, even in the short run, is bound to win? Remember that more, and not fewer, points of *sound* electrical contact with the public are needed to-day, and the wisdom of the co-operative spirit embodied in Clause 48 of the Electricity (Supply) Act becomes at once both apparent and compelling.

I have said that, in the majority of localities, the various sections of the electrical trade are getting together to secure the maximum possible good (in the shape of domestic electrification, for example) both to the public *and* to the trade, and the point is worthy of considerable emphasis. I say that the greatest good will not be conferred upon the public unless the trade itself takes every possible care to operate on fair and reasonable business lines. The present tendency to cut wiring prices to the bone (and even to splinter the bone!) and the impression that appears to prevail among members of the public that all electrical apparatus is "subject" to some more or less ridiculous discount, are infinitely damaging to the whole industry and react to the persistent disadvantage of the public.

So long as such profitless work and sales are deliberately sought and encouraged by certain ill-trained or muddle-headed members of the trade, so long will the public be provided with shoddy and troublesome installations, and so long will the cost of apparatus remain at a high level in order to balance the constant stream of minor business failures, and the subsequent load of bad debts piled up within the industry itself. We have a reputation in Lancashire for plain speaking, and certain internal ills from which our industry is suffering to-day call for vigorous exposure and equally vigorous action. I have been in the trade for more years than I care to remember, and the reckless business stupidity of certain members of the trade fills me with the utmost apprehension. Is an electrical installation such a poor proposition that it must be given away with a pound of tea? Is domestic electrical equipment of such poor utility that it must be consigned to the bargain basement in order to effect a few sales? Can it be urged for one moment that the reputable electrical labourer is unworthy of his hire, or that sound electrical equipment is unfit to carry a fair and reasonable business price?

Addressing myself, through your columns, to the electrical industry itself, I want to stress one serious point. For the future welfare of the industry, for the good name and progress of domestic electrification, we simply *must* get away from shoddy wiring and from cheap and nasty accessories and equipment. "Among

ourselves," will you permit me to remark that the electric lighting installation of the past was a simple proposition, carrying very little risk to the public? On linoleum-covered or carpeted floors a lighting installation had to be hopelessly bad, abominably abused, or foolishly "experimented" with, for members of the public to suffer any serious consequences; but the heating, cooking, and auxiliary services now being brought into the Englishman's home represent a totally different type of story. We are bringing this *power* into damp kitchens and sculleries, into bathrooms and other thoroughly "earthed" situations, and a red light is already being glimpsed by those with sufficient clarity of vision to see a few yards (or a few years) ahead.

I seriously hope that these remarks will not stimulate very mixed emotions among level-headed electrical men. It may be that, as president of the Electrical Contractors' Association, I shall be charged with making yet another attempt, for selfish trade reasons, to increase the cost of wiring work and equipment. Nothing, however, could be further removed from the truth, and I most seriously urge (1) that our supply authorities be given power to enforce a minimum standard of domestic electrical safety in their areas, and (2) that active inspection be instituted to ensure that that standard of safety is strictly maintained.

Let it be clearly understood that such a minimum standard of safety shall *not* involve the selection of special apparatus, such as the selection of a particular fuse-carrier, or what not, to be used in any particular area. In that direction lies utter confusion and complete futility. We want no individual "fads and fancies," but we do want a minimum "quality" requirement in order to rule out the shoddy Continental material which is coming, once again, in such overwhelming flood to this country. So far as the inspection of wiring work in progress, and after completion, is concerned, reputable electrical contractors and the public have nothing to lose and everything to gain from a system that would prevent robbery of the public, who may pay good money for bad work, and the jeopardy of valuable lives, by the unscrupulous or incompetent traders who exist in our very midst at the present moment. It will be agreed that I am not mincing my words, but in view of the power developments now taking place on domestic premises, I do not feel called upon, once more "amongst ourselves," to express myself in any halting or diffident manner.

In one concluding paragraph let me assure the industry at large that the Electrical Contractors' Association is working *as never before* to establish the installation trade on a basis that shall be fair and reasonable to all other business interests and most strictly fair and reasonable to the public. It is a cardinal principle of our trading policy that no service deserves no reward. We are determined to oppose obstructive and wasteful profit-snatching, no matter where it be found, and we are equally determined to see that the public is provided with a square, straightforward, and safe deal in return for square, straightforward, and sane payment.

The Retirement of Mr. Beauchamp.

His Return to Power Supply Business.

As was briefly announced in our last issue, Mr. J. W. Beauchamp, M.I.E.E., is vacating the post of director and secretary of the British Electrical Development Association, Inc., at the end of the present year in order to succeed Mr. W. A. Chamen as general manager of the South Wales Power Company, Limited, and the South Wales Electrical Power Distribution Company. Mr. Chamen has been general manager of these companies for 22 years, and on his retirement from that office he will become a director of both companies.

During the past eight years Mr. Beauchamp has been so prominently before all sections of the electrical public as the founder, director and secretary of B.E.D.A. that his manifold activities, designed to stimulate electrical applications of all kinds and generally accelerate the rate of progress, may, for some, have obscured the fact that before he was called upon to associate himself with that very important piece of work, he occupied a prominent position in the electricity supply field as engineer and manager of undertakings which served considerable industrial areas as well as carrying domestic loads.

The fact of his being deputy engineer at Sheffield when the Corporation Electricity Department was beginning to develop an industrial load on a large scale, and his subsequent control of the West Ham electricity undertaking (as its engineer and manager) with its large factory and Thames-side dock load, have doubtless had something to do with his decision to assume the management of the South Wales undertaking, which is essentially one meeting the requirements of large power consumers.

The host of friends that Mr. Beauchamp, with his unassuming and most tactful manner, has made during the years when his E.D.A. operations have been constantly bringing him into direct relations with practically every section of the profession and industry for some purpose or other, will desire to join with us in wishing him every success in his new position.

His name will always be associated with the establishment of E.D.A., with the effective demonstration for which it was responsible at the British Empire Exhibition at Wembley, with the Home Wiring Campaign of last winter and the Circle Campaign that is now in progress, and many other successful events on a smaller scale. During the last few years the Association has been lifted to a much higher level of usefulness than was possible in the earlier days, when the industry was but learning the potentialities of united action. When looking back over the past eight years it will be remembered that the initiation of the scheme for such an organisation called for a man possessing a most intimate knowledge of all the different electrical interests which were to be brought into co-operation. In the retiring director this knowledge of interests and of personalities connected therewith has been conspicuously present, along with a remarkable initiative, ingenuity and courage. Mr. Beauchamp has been fortunate in having around him capable men and women who have helped to develop his and his Executive's ideas, and under the new chief, whoever he may be, this experienced staff will, we are sure, be able to achieve great things in the days of more expansive electrical development. The Association has already laid the post open for application, by public advertisement, and we hope that the Selection Committee will succeed in securing the right man to fill "J.B.'s" shoes when he leaves Savoy Street for South Wales.

Three Years' Experience in an All-Electric House.

The author records the results obtained under normal conditions in a house which is wholly dependent on electricity for lighting, heating, cooking and hot-water supply.

By Professor S. PARKER SMITH, D.Sc., M.I.E.E.

THIS ten-roomed house is fully described in the *Journal* of the I.E.E., Vol. 64, p. 289. In it the cooking, heating, hot-water and lighting services are entirely electric. The interest and criticism aroused can be judged from the discussions at the twelve I.E.E. meetings at which the paper was read, while the following account may enable the reader to judge as to the success of the undertaking. The figures for consumption and running cost are given in Tables II, III and IV for the three years—July 12th, 1924, to July 9th, 1927. The house is normally occupied by six persons, excluding guests.

Figs. 1 and 2.—Domestic Electric Cookers, with Plug-type Aluminium Utensils, without Flexible Leads and Boiling Plates.

It will be readily understood that after three years any novelty has worn off, but certain impressions are likely to remain. The anticipated comfort, convenience, cleanliness and economy have been fully realised, while there have been no disappointments. One benefit —a cause for much thankfulness—has been very marked, namely, the good health enjoyed by the members of the household. Colds, chills, and other illnesses have been practically unknown. The services of the family doctor have only once been required, to attend to a nasty burn caused by the fusing of a wire on a flat iron. The supply has not once failed. No difficulty whatsoever was experienced during the long strike of 1926, although, naturally, care was taken to reduce consumption whenever possible during that period. The additional cost of energy owing to the strike is set forth in Table III. (From October to December, 1926, 10 per cent. was added to the charges for energy. From December, 1926, to May, 1927, the day rate was raised to 0.75d. and the night rate to 0.625d. per kWh.)

As regards maintenance, the chief trouble occurred at the outset in connection with the switch-sockets. These were a new pattern, and, unwisely, wood boxes instead of iron boxes were selected. Faulty switch-sockets were readily replaced by the makers, and an improved mode of fixing was adopted, so that there only remained the trouble of fixing the new sockets. It was found desirable to earth appliances used in the bath room and kitchen—an impracticable matter with some makes of kettles, irons, &c. It may be well to add that thorough earthing of electrical appliances has also a disadvantage, for when a fault does occur the fuses are blown with such vigour that the detonation is apt to frighten non-technical people, while the amount of damage done in burning out neighbouring fuses, shattering glass covers, and producing large volumes of smoke, may be troublesome. The apparent remedy is the use of fuse boxes with a non-combustible lining and cover, and non-combustible partitions between the several fuses in a box. Flexibles proved a nuisance at first with some appliances. The use of very stout flexible cords, preferably silk covered, reduced the trouble, but investigations to overcome flexible failures have not yet yielded a solution. The appliances have not given much trouble—now and again an element or a lamp has had to be replaced; generally speaking, the burnt-out elements always occurred in the same appliances. Most of the appliances have given no trouble of any kind.

Practically the only additions to the original wiring scheme were the replacement of certain 15-ampere plugs by 15-ampere adaptor plugs arranged to take 5-ampere plugs, in order to provide additional points in certain rooms, and the lighting of cupboards.

It may be well to speak of the several services separately:—

Heating.—The principle of heating by radiation, or of warming the occupants of the room directly and making convection a secondary matter, has proved successful. No discomfort has been experienced from insufficient warmth, or from cold walls. At times, two or even three small fires in a room were used to distribute the heat, as required. Facilities for occasional heating, particularly in bedrooms, were greatly appreciated; and this comfort was obtained at very small cost.

A small hand-regulated arc lamp in series with an 8-ampere fire was found to give beneficial results from "artificial sunlight" treatment, particularly in winter. This small lamp appeared to be sufficient to serve as a general tonic and to remove twinges of rheumatism.

The consumption figures in Table IV show that the heating remains fairly constant, the variations being mainly due to the length and severity of the winter. Probably occasional heating has increased during the latter part of the three-year period.

Cooking.—It may be said that the cooker is practically the only appliance that had to be replaced. The cooker originally installed was a standard pattern with two open-type boiling plates. The open-type plate was largely introduced on account of the complaints in Glasgow that the closed types were too slow. Experience soon proved that not only was the open-type also slow and inefficient, like the closed-type, but it was unreliable. For several months tests were carried out with boiling plates, and a method was evolved for testing appliances of this kind (*see* "Electrical Cooking Appliances for Domestic Purposes," by S. Parker Smith, N. M. MacElwee and J. G. Boyne, *World Power*, Vol. 6, p. 137). The conclusion was reached that for short operations, such as occur in kitchens of dwelling houses, the efficiency of open, semi-closed and closed types of boiling plates was hopelessly low, and that the consumption figure of 1.3 kWh per person per day with open-type plates in the first year was unjustifiably excessive. As regards reliability, the closed-type alone could be considered. Many types of plates were tested, and invariably the advertised efficiency guarantees were found to be misleading. A figure of 80 per cent. would be claimed, whereas the test figure would be 30 per cent. The solution was found in the principle of the electric kettle. With this form of utensil, efficiencies of over 90 per cent. were readily obtainable.

TABLE I.

Costs of Cooker with Self-contained Utensils (from Messrs. Arch. Low & Sons' list).

Item.	Cost. £	s.	d.
Table-type cooker, with oven	19	10	0
Ordinary-type cooker, with oven ...	21	15	0
Aluminium pot, 2-pint size	2	8	0
,, ,, 3-pint size	3	0	0
,, ,, 6-pint size	3	15	0
,, ,, 9-pint size	4	10	0
,, ,, 12-pint size	5	5	0

The type of cooker eventually developed is illustrated in figs. 1 and 2, showing two different arrangements. Where space permits, the table type is to be preferred. The cooking utensils are now made of aluminium and arranged for three-heat control. There are no flexibles. At the back of the pots a watertight three-pin plug is fitted, which can be inserted in any of the cooker sockets. The cooking table is earthed, and so provides an effective earth for all the utensils. It will be understood that there is not the same chance of waste by leaving the current on with the self-contained utensil as with the boiling plate. Provided the plug is not inserted in the socket until it is required, there is little risk of the pot being switched on dry. Obviously care should be taken to prevent the pot boiling dry.

In addition to the oven, grill and boiling utensils, one closed-type boiling plate is provided. This is necessary for the frying pan and for ordinary pots. Three utensils with self-contained elements may well suffice for ordinary needs, but the one boiling plate has an adverse effect on the consumption. Instead of from 0.5 to 0.6 kWh per person per day, nearly 0.8 was consumed in the third year. The second year represented a transition period. It is to be hoped that an efficient electric frying pan will soon be available to reduce this figure.

The one drawback of the utensil with self-contained elements is its price. The cooker itself costs about the same as a standard cooker, and the pots are therefore an extra, as will be seen from Table I. On the other hand, 1,000 kWh at 1d. per kWh, for example, represents a saving of £4 per annum.

It may be mentioned that several large corporations are reverting to closed-type boiling plates to reduce maintenance, but the battle of the gas ring *versus* the electric boiling plate still goes on.

It is desirable in electric cookers to provide an extra 5-amp. socket. This furnishes the extra point in the kitchen at very small cost, and enables, for example, an electric kettle and electric iron to be used simultaneously.

Hot Water.—Before installing the hot-water tank, careful experiments were made to determine the best lagging, shape of tank, &c. (*see* "The Heating of Water by Electricity for Domestic Purposes," by S. Parker Smith and N. M. MacElwee, *World Power*, Vol. 5, p. 7). The tank has been entirely satisfactory, and no elements have been replaced. The water is heated to 140 deg. F. as a rule, the limits being 120 and 160 deg. F. In case an extra supply is needed, the supplementary heater near the top of the tank is switched on. The cost is admittedly higher than with a coke boiler, but the convenience and the absence of attention and upkeep are great advantages. During the 1926 strike it was possible to reduce the hot-water consumption—otherwise it is practically equal to the heating consumption.

TABLE II.

Total Consumption in Units Recorded on Main Two-rate Meter.

	First year.	Second year.	Third year.
Day load ...	10,299	9,713	9,079
Night load ...	6,043	5 827	5,241
Total for year ...	16,342	15,540	14,320
House closed ...	19 days.	10 days.	13 days.

TABLE III.

Total Annual Cost of Energy (based on Consumption Recorded in Table II).

	1st year. £	s.	d.	2nd year. £	s.	d.	3rd year. £	s.	d.
Day load, at ½d. per unit ...	21	9	2	20	4	8	18	18	3
Night load, at ¾d. per unit	9	8	10	9	2	1	8	3	9
Fixed charge	12	10	0	12	10	0	12	10	0
Total for year	43	8	0	41	16	9	39	12	0
Extra for 1926 strike ...							9	0	3
Total for third year ...							48	12	3

TABLE IV.

Analysis of Consumption in Units as obtained from Separate Meters.

		First year.	Second year.	Third year.
Heating		5,954	6,636	6,585
Hot water	day	1,242	1,245	1,103
	night	6,043	5,827	5,241
Cooking		2,777	1,858	1,706
Lighting		568	687	717
Total		16,584	16,253	15,352

Lighting.—The figures show that this is almost a gift, and it is readily understood that abundant light is one of the benefits of an all-electric house. For this reason, larger lamps are now installed than formerly, and the energy consumption has increased accordingly.

The Use of Electricity in the Homes of Canada.

Low Charges accelerate the rate of Domestic Development.

By A. S. L. BARNES.

IN the more settled parts of Canada, due to the great extent to which her abundant water-powers have been developed, domestic use of electricity is so common as to render cases where it is absent specially noticeable, and this use is so seldom confined merely to lighting that this article will deal chiefly with the situation as it is affected by domestic electrical appliances.

The *per capita* use of electricity in Canada is very high, being nearly, if not quite, the highest in the world, and although the extensive use of hydro-electric power in industry contributes greatly to this result, there is no doubt that the great popularity of electricity in the home affects it considerably.

It is perhaps hardly fair to make comparisons because of the large consumption of electricity in the manufacture of pulp and paper, in mining and in electro-chemical industries, but though the *per capita* consumption of electricity in the United States is quite high—about 530 kilowatt-hours per annum—that of this Dominion is two and a-half times as great, and for Ontario and Quebec it is nearly four times that of the United States.

The principal supply authorities which make possible the widespread distribution of electricity in the homes of this country are: In and around Vancouver, B.C., the British Columbia Electric Railway Co.; in Alberta, the Calgary Water and Power Co.; at Calgary and at Edmonton, the Municipal Electric Light and Power Department; in Manitoba, the Winnipeg Hydro-Electric System and the Winnipeg Electric Co.; in Quebec, the Montreal Light, Heat and Power Co., the Southern Canada Power Co., the Shawinigan Water and Power Co., and others; in Ontario, the Hydro-Electric Power Commission of Ontario, which distributes power practically all over the more thickly-populated parts of the province, and the Dominion Power and Transmission Co., which supplies the city of Hamilton and some of the surrounding territory; in the maritime provinces—Nova Scotia and New Brunswick—the Nova Scotia Power Commission and the New Brunswick Electric Power Commission respectively. Besides the foregoing, there are, of course, very many small private companies and local municipal undertakings which take their share to a greater or less extent; and also, in some cases, the larger supply authorities specifically mentioned above purchase power in bulk from other large undertakings of which no mention has been made.

In the city of Winnipeg, and in many places in the province of Ontario, domestic rates for electricity have been established which, compared with most other places in the world, are very low. These low rates naturally tend to an extensive use of electricity in the home, but, in addition to this, both of the supply authorities in these respective parts of the country are very active in fostering such use.

The domestic rates charged by the supply authorities in other parts of Canada are, in most, if not all, instances higher than in Winnipeg and Ontario, and this must obviously retard the growth of the demand. The larger companies, however, outside the two areas named, are by no means backward in their efforts to increase the use of domestic electrical appliances, and it is believed that in some cases reductions in domestic rates have recently been made to further assist these efforts.

The manufacturers, contractors, and other interested bodies are, naturally, in many instances, doing what they can to induce people to use electrical appliances.

The Canadian Electrical Association, which is closely affiliated with that much larger body, the National Electric Light Association of the United States, has offered four cash prizes for 1927-28 to electric light and power companies numbered among its members for the greatest total sales of domestic electrical appliances per lighting consumer. Nineteen items, including incandescent lamps, are in the list of articles classed as "electrical merchandise" for the purposes of the competition. The 1926-27 competition is said to have resulted in sales averaging in value $12.43 per customer.

The British Columbia Electric Railway Company, in its sales efforts last year, sold nearly a quarter of a million dollars' worth of domestic electrical appliances. This company has been particularly active with regard to electric ranges; some time ago a sort of cookery school was started in one of the theatres in Vancouver and was patronised very largely, with good results.

In Vancouver and its vicinity electrical appliances are used extensively and are becoming increasingly popular. Of electric ranges, there are some 4,000 in use, with probably another 1,000 scattered over some of the smaller towns in the province, and there are about 3,000 electric water heaters, which are charged for on a flat-rate basis of $4 per kilowatt-year. Electricity is used in about 76 per cent. of the homes in British Columbia, and nearly every one of these has some electrical appliance, *e.g.*, a hot-plate or coffee percolator. Many of the smaller towns and rural districts are now supplied with electricity from one or other of the large hydro-electric power stations, and in most of these cases the rates are sufficiently low to make the use of appliances attractive, but where supply is obtainable only from a small undertaking, the rates are usually high and form an effective bar to the general use of electricity for anything other than lighting.

Of electric refrigerators there are approximately 500 in use in the province to-day.

The "Red Seal" plan of wiring houses, reference to which is made below, is being tried, and the provincial rules require at least one "convenience outlet" in every kitchen, while the extension of this requirement to include the dining-room, sitting-room, and other parts of a house is under consideration. Similar rules are believed to be in force in Winnipeg.

The need for such rules has arisen owing to the practice, which a few years ago was becoming all too general, of connecting all kinds of appliances to lamp-holders, through the medium of various types of adaptors. Hence Inspection Departments are beginning either to forbid this practice, as in the two instances mentioned above, or are at least discouraging it in some way.

One of the more important companies in the province of Quebec, though not the largest, reports that the use of electrical appliances is very extensive and is growing rapidly. The value of appliances sold for 1927 will, it is expected, average about $15 per lighting consumer, and the tendency of this figure is to increase. The connected load represented by the aggregate capacity of the appliances sold by this company during the twelve months ended September, 1926, amounted to over 2,000 kilowatts, in addition to which the corre-

sponding figure for the lamps sold in the same period was almost exactly the same. The appliances sold would, however, represent, subject to some diversity factor, a corresponding increase in actual load and demand, whereas the lamps would not, since no doubt many of these would be replacements. The figures, however, are very good considering that the territory served contains only quite small towns, villages, and rural districts—there are no large cities like Montreal or Toronto included at all—and the total number of domestic consumers is only about 17,000. The appliances sold in this case during the year included over 25 different kinds, among which were the following:—

Appliances.	Approximate number sold.
Smoothing irons	650
Toasters	340
Ranges	130
Water heaters	120
Air heaters	110
Vacuum cleaners	100
Curling irons	500
Washing machines	145

A movement was started in Canada about two years ago, and has now been adopted extensively in the United States also, known as the Red Seal Standard for wiring houses. The Electric Service League, which is the organisation responsible for the standard set, advocates "adequate wiring for good illumination and other electrical conveniences." According to an article published recently in the *Electrical News*, there are now in Toronto no fewer than 2,000 houses wired in accordance with the Red Seal standards, and it is stated that this part of Electric Service League work alone totals half a million dollars' worth of extra business, on the assumption that each house represents a gain of $250 in wiring and appliances—which, presumably, is a fair assumption. The manager of the League claims that very little trouble is now being experienced in getting installations properly put in. It is stated that in Toronto "there are now 250 general building contractors, mostly house contractors, who are 100 per cent. Red Seal . . . ." The League also co-operates with contractor-dealers, and is now getting into touch with the architects.

Information has recently been received which indicates that, for some reason or other, the people of Canada are at present able to purchase electrical appliances, especially ranges and smoothing irons, at prices very appreciably lower than those obtaining in the United States. If this be true, then it is no wonder that, in those parts of Canada where low rates for electricity prevail, the use of domestic appliances has grown, and is growing, with great rapidity.

In Nova Scotia and New Brunswick the use of domestic electrical appliances is already quite extensive and is growing rapidly, especially in the cities and larger towns. In the rural and less thickly populated centres, where electric service is available, the cost of energy is rather too high to conduce to any considerable use of electric ranges, although other appliances not requiring so much current are quite popular.

The Hydro-Electric Power Commission of Ontario, while certainly not the only organisation which compiles statistics regarding its rates and the sale and use of domestic electrical appliances, probably makes much more of such information available for public use—through publication of its annual reports and its monthly "Bulletin"—than is customary with other electricity supply authorities in the Dominion.

The low domestic rates generally prevailing throughout the province of Ontario, combined with the activities displayed by the Hydro-Electric Power Commission, by the local "Hydro" authorities in the various municipalities, by the manufacturers, and by others interested, are responsible for the wonderful results obtained up to date, which are indicative of the possibilities in other parts of Canada.

The figures given in the following table apply to conditions up to the end of 1926, and refer, in most cases, to what has been accomplished in approximately 200 municipalities having an aggregate of nearly 377,000 houses wired for electricity. Some of the figures are estimates, but they are based on data considered to be sufficiently reliable to give results quite closely approximating to actual conditions.

Domestic appliance.	Estimated number installed at end of 1926.	Percentage saturation.	Approximate kW of connected load.
Ranges	70,880	18.8	425,100
Hot plates	25,300	6.6	50,500
Washers	78,000	20.7	15,600
Vacuum cleaners	75,100	19.9	15,000
Water heaters	26,000	6.9	39,100
Grates	16,800	4.4	33,600
Portable heaters	106,000	28.0	84,800
Ironers	2,260	0.6	6,700
Smoothing irons	311,400	82.9	205,400
Refrigerators	2,670	0.7	500
Toasters	160,000	42.5	88,000
Grills	42,000	11.2	27,700
Total load (kW)	...	...	992,000

It is fortunate for the Commission that on this connected load there is a good deal of diversity, for it (the connected load) is approximately equal to the sum of all the maximum loads on the Commission's systems; which means that if there were no diversity, there would be no generation capacity available for supplying power for any other purpose whatsoever.

In Ontario, the number of domestic consumers is about one-fifth of the number of people, which, on the basis of five persons per family, is getting near to the saturation point. In the municipalities covered by the figures given above, embracing 195 out of 262 which were asked to report and which include all the more important places in Ontario—the percentage of saturation for smoothing irons is practically 83, while the great popularity of portable heaters is evidenced by nearly 30 per cent. of saturation. The latter figure has been obtained in spite of the fact that the Commission has deliberately discouraged the use of such heaters for several years in order to prevent a shortage of power such as occurred during the war.

The percentage of saturation in the case of toasters is high, and even on electric ranges, washing machines and vacuum cleaners is reaching a considerable figure.

Since there is no doubt that in some municipalities the saturation point is considerably higher than in others, this point must already, in such places, be almost reached. Owing, however, to the fact that new uses are constantly being found for electricity, it would be rash to state that the ultimate individual domestic demand has been attained even in any single instance.

The appliances purchased by "Hydro" consumers during 1926 added about 153,000 kilowatts to the connected load.

The total "Hydro" sales of appliances in 1925 were as follows:—

Ranges	4,612	Air heaters	1,201
Hot plates	949	Ironers	110
Washers	2,268	Irons	7,514
Vacuum Cleaners	1,442	Refrigerators	109
Water heaters	889	Toasters	2,412
Grates	224	Grills	953

A survey made in 1924 by the Hydro-Electric Power Commission of Ontario yielded the following figures for electric ranges:—

City.	Population.	Houses wired.	No. of ranges in use.	Percentage saturation.
Barrie	7,000	1,700	170	10
Brantford	32,000	5,000	1,400	28
Chatham	16,000	3,600	660	18
Kitchener	22,000	4,400	660	15
London	61,000	14,000	4,000	29
Niagara Falls	16,000	3,200	900	28
Stratford	18,000	3,600	1,500	41
Windsor	43,000	11,000	4,000	36
Totals	278,000	46,500	13,290	28

Readers at home, in looking over figures relating to Canada, should try to visualise the fact that there are only about 9,000,000 people in the whole country, and that the figures given above apply in some cases to small towns at considerable distances from each other, and to purely rural districts.

Domestic Electricity in South Africa.

A Review of Development in the Principal Towns.

By E. POOLE, A.M.I.E.E., Durban.

WHILE South Africa, like many other countries, finds that the use of electricity for domestic purposes is chiefly confined to lighting requirements, other domestic development not having gone ahead to any great extent, there is striking evidence of demands for cooking and heating to be found in Durban, Natal.

Domestic developments on anything like a large scale can only be looked for in those towns where, with large outputs and low costs of production, a resulting cheap tariff makes the application of electricity an attractive proposition; unfortunately, there are very few towns where such conditions apply. The scattered population of this sub-continent, which covers a vast area, is only about the same as that of one good-sized Home town, and while there are 95 towns owning electrical undertakings, with white populations varying from 172,740 (Johannesburg) to as few as 670 in the smallest town, of these there are only 13 with populations of over 10,000, so that the demand generally is of a very restricted nature.

Being a new country it is ready to profit by the experience of older countries, the electrical undertakings of the principal towns being well up-to-date, and it may surprise Home readers to know of townships with no more than 670 inhabitants having their own electrical undertakings.

Distribution systems, except in the business areas of the principal towns, are carried out by means of overhead mains, which fortunately as yet are not too badly hampered by the legislative restrictions which retard developments in other countries. This form of distribution is practically universal, with overhead services direct on to the houses.

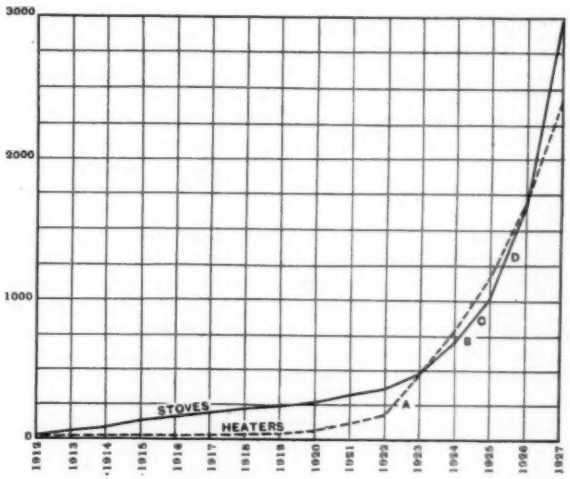
In many ways South Africa offers an ideal field in which the electrical engineer has free and ample scope to develop the applications of electricity, and the Home electrical engineer may envy the unrestricted field in which his South African *confrère* is placed, for with three exceptions (Johannesburg, Capetown and Port Elizabeth), and there only in confined areas, there is no gas competition. Climatic conditions cry out for a cool kitchen and some means of cooking that will not "cook the cook." The domestic servant, generally recruited from among the male natives, is as much a problem as elsewhere, and like the coal stove, in what is practically a sub-tropical climate, should be ousted from the kitchen.

The question of tariffs is naturally the principal factor in the domestic development business, and it certainly needs a far-sighted engineer with a strong determination to push the business, to come down from his ordinary charges of, say, sixpence, or in some cases as high as one shilling, per unit to a secondary charge of twopence or one penny or less per unit, such as is possible by adopting the well-known "Norwich" system or some similar sort of tariff whereby the standing charges are first met by the higher rate or "basis" charge while the lower rate or "secondary" charge just covers working expenses.

Unless, however, the "secondary" charge can be reduced to one penny, or less, there seems little prospect that domestic electricity in South African towns can develop to any great extent, as the majority of the undertakings have small outputs with working costs far too high to permit of so low a rate.

Nevertheless some of the larger towns, notably Capetown and Pretoria with their modernised plants, are at last following the example which Durban set some 15 years ago when it launched out with an attractive tariff of 5d. for a minimum number of units and ¾d. thereafter, later reduced to ⅝d., less 10 per cent., to encourage the domestic side; but in the case of Johannesburg, the town also possesses a municipal gas undertaking, in which it apparently has more faith than in electricity, as at the present moment very extensive additions are being made to the gas plant at a cost of about £400,000, and electrical development may be expected to suffer in consequence.

In a few of the smaller towns efforts are being made to build up a domestic load, though generally they are handicapped by high working costs, but the establishment of the Electricity Supply Commission's large power stations and the electrification of the South African Railways with the transmission lines also serving the various towns en route, will go a long way towards the desirable end of wiping out the high costs, by supplying in bulk as it is already doing in some portions of Natal, *e.g.*, Glencoe Junction, Ladysmith, Pietermaritzburg and Estcourt: even Durban with its already economical plant will be purchasing in bulk next year when the Commission's new Congella undertaking is at work, and still further economies may be looked for, to the advantage of the consumers.



A. Municipal Bath-heater Scheme introduced January, 1923; 100 heaters for purchase or hire.
B. "Electrical Week," December, 1924, including an Electrical Exhibition in the Town Hall.
C. Assisted Purchase of Heating and Cooking Appliances Scheme introduced, April, 1925.
D. Advertising Campaign commenced, June, 1926.

Durban's Yearly Increase in Electric Stoves and Water-heaters.

While evening rather than midday dinners are more often the custom in South Africa, the effect of the cooking demand on the load factor needs serious consideration, though it is found that the diversity of the demands helps to regulate the factor, but Durban is now considering the introduction of a restricted-hour or "off-peak" tariff in the case of large central water heaters,

whereby a cheap rate can be given with a restriction on the supply during the two hours of peak load for the three winter months.

The table below contains the names of a few of the only towns where tariffs appear attractive enough; this will give the reader some idea of how domestic development is being catered for. The table shows how very enterprising Durban is in developing the domestic side of the business, and the borough electrical engineer (Mr. John Roberts) is to be very heartily congratulated on the success attending his efforts, which is very clearly shown in the curve (p. 667) of the increase in stoves and water heaters since 1912. These now total approximately 3,000 and 2,500 respectively, and during the past 12 months have been increasing at the rate of about 100 stoves and 60 water heaters per month.

This confidence in the application of electricity is borne out by houses being built without chimneys in some cases, and flats with no provision other than electricity for cooking, and Durban can boast of hundreds of "all-electric" houses to-day, with quite a number consuming over 1,000 units per month. An average of from 500 to 600 units per month at a cost of £1 15s. or less per month for lighting, cooking and heating is common, the average maximum demand working out at about 2 to 2½ kW per consumer.

An active advertising campaign and a scheme for assisting the purchase of stoves and heaters, together with wiring, is largely responsible for the phenomenal growth shown in the curve, in addition to which credit has to be given to three exhibitions, and it is hoped shortly to arrange a showroom where consumers can be further impressed with the advantages of adopting electricity in the home.

The assisted-purchase scheme provides that the consumer may select any make of stove over £12 in value, and the Corporation pays the contractor or seller the whole amount outright. The consumer or buyer enters into an agreement with the Corporation to repay the amount by a 10 per cent. deposit, and the balance in monthly instalments with interest at 6 per cent., which may be spread over a period of three years, and at the present moment approximately £50,000 has been advanced.

The question of the provision of hot water has also engaged the serious attention of the Durban electrical department; for reasons well known to the distribution engineer, the use of the "Geyser" type, taking a heavy amount of current and giving a quick supply of hot water, is prohibited, the amount of current for water heaters being limited to 12 amperes per house, and there would appear to be an opening for a thermostatically controlled type of heater if manufacturers will make their price an attractive one.

The Corporation itself has introduced a 10-gallon type of heater, taking only 300 watts, to encourage a night load; it can be hired out at very cheap rates, but with this exception there is no hiring out of appliances, and the Corporation does not undertake repairs. Other water heaters are made locally at a cost of about £12

Table of Domestic Development of Electricity in some of the S.A. Towns. *August, 1927.*

Town.	Popu'ation W—wh te C—coloured	Total units sold for all purposes 1926.	No. of consumers lighting & heating.	Date of introduction of cheap rate.	Domestic tariff for average 5-roomed house. Basis rate.	Basis units.	Secondary rate (pence)	House-hold coal per ton.	Approximate No. installed. Stoves	Water heaters	Remarks.
Durban	52,203 W 56,685 C	62,697,956 (1927)	16,685	1912	5d.	28	⅝d. less 10% Norwich	£1 15 0	2,961	2,400	7½d. and 1d. or 6½d. and ¾d. for all suburbs within 16 miles of Borough. Large industrial load also.
Capetown	111,750 W 92,860 C	32,881,106	20,750	1924	5d.	25	1d net. Room basis.	£2 5 0	450	190	Special hot water rate 30/- per month per kW. continuous supply. Gas Co. in competition.
Pretoria	43,000 W 25,000 C	13,656,630	8,300	1926	5d. 2d. 1d.	32 32 32 96	Valuation ¾d.	£1 2 0	179	103	Special hot water rate 30/-per month per kW. continuous supply.
Paarl (Cape) ..	6,670 W 7,600 C	376,950	1,487	1925	9d. to 6d. net. (Lighting only).		1½d. flat rate Cooking heating.	£1 0 0?	50	15	
Port Elizabeth ...	26,982 W 20,112 C	6,827,598	6,014	1917	6d.	20	1d. Norwich	£2 0 0	40	10	Gas Co. in competition, which hires out stoves at 1/6 monthly.
Worcester (Cape) ...	4,100 W 4,900 C	322,021	822	1921	10d. to 8d. net. (Light only) 3d. c oking only).	— 50	— 1d. net.	£2 0 0	26	51	Special hot water rate 20/-per month per kW. continuous use.
Kingwilliams Town (Cape)	5,684 W 3,459 C	1,145,392	1,100	1927	9d. less 25% (Light only).	—	(Cooking only) 1d. for 30 0units then ¼d. all in excess of 300 units.	£1 17 0	19	—	A further 20 stoves now being installed.
Ladysmith (Natal)	3,483 W 3,800 C	780,271	668	1926	7d. plus 10/ mon hly (service charge).	14	¾d. less 5% Norwich	£1 3 0	14	9	Current supplied in bulk by Electricity Commission
East London ...	18,500 W 14,100 C	4 415 739	4,400	1926	8d.	16	1½d. Norwich	£1 16 6	3	3	
Johannesburg ...	17?,749 W 132,700 C	54,687,593	31,878	1913	6d.	25	1d.	£1 5 0	No	records	The only town in South Africa owning Municipal G s Works and electrical development is not much in evidence as a consequence.

fixed complete, taking 500 to 2,000 watts, and provided with a three-heat switch; these answer the purpose very well in providing an all-day supply of water hot enough for washing-up purposes if on the low heat, or for a bath in about 1½ hours if on the high heat.

Distribution problems are in many respects responsible for the lack of encouraging a domestic load, especially in the case of a d.c. system, but the sooner engineers realise that the time is arriving when the consumers will demand a supply, the less costly it will be to alter their distribution to meet those demands.

In Durban the demands are easily dealt with by interposing an additional street transformer tapped off one of the many underground high-pressure ring mains and feeding into the overhead mains distribution system. The distribution area of Durban has lately been augmented by the addition of a 16-mile radius outside the borough, and it embraces all the suburbs to which a cheap tariff has been extended, the nearer suburbs being charged at 6¼d. p.u. for 24 units and ¾d. thereafter, and the remote suburbs at 7½d. and 1d., but the scattered nature of the distribution does not so easily lend itself to the interposition of additional transformers as within the borough. A system is now being tried out of establishing one central sub-station for each suburb, and using pole type auto-transformers fed by an all overhead three-wire (neutral "earthed") 1,100-volt supply with taps on to a three-wire (common "earthed" neutral) 400-volt distribution for the consumers' supply at 200 volts, and as the demands increase, so additional auto-transformers can easily be added to keep up the pressure on the system; thus greater distances can be covered at a minimum of expense and voltage drop overcome.

Other towns, even those of small outputs, are gradually emulating Durban's example, and no doubt they will profit considerably by Durban's pioneer work in educating the public to the advantages of the use of electricity in the home, as well as in overcoming the prejudices against new methods, to say nothing of the value of the experiences of the electrical department in at first introducing apparatus of its own design and make, and encouraging local manufacturers to follow up the development, as well as the progressiveness of the local contractors in introducing various type of stoves and apparatus—all very useful to the manufacturer as indicating the style of appliance which finds greatest favour.

Capetown ranks second with 450 stoves and 190 water-heaters connected, but delay in the development has been due to the large reconstruction and standardisation work in the distribution system practically right through the many large areas. It is now spending a large sum of money in providing a well-equipped showroom to give a further "boost" to the domestic side, and in addition, three exhibitions have been held.

An assisted-wiring scheme has been in existence during the past six years, and has been taken advantage of by over 5,000 consumers; facilities are now to be given for the hire-purchase of the larger apparatus.

It has only within the last three years reduced its domestic rate to as low as one penny, and yet more recently has introduced a special hot water rate on a fixed charge of 30s. net per month per kW for continuous use (an equivalent of ½d. per unit), while other towns are also adopting a similar charge for hot water.

Pretoria, the capital of the Union, being mainly a residential centre, has shown good progress during the 16 months that a low rate has been in operation, with its 179 stoves and 103 water-heaters. It has held three very successful exhibitions, and renders assistance in the purchase of apparatus, and the majority of consumers with stoves installed are using well over 350 units per month. Like other towns, it is also reinforcing its distribution system to cope with the demand that is likely to be made in the near future.

Port Elizabeth has held one exhibition, but has no showroom as yet, and as the gas company hires out stoves at 1s. 6d. per month, it becomes a serious competitor, especially as the electricity department has not adopted any "hiring out"—indeed, it is quite exceptional among the various towns to "hire out" or to undertake repairs of apparatus.

Bloemfontein, the capital of the Orange Free State, has very few users of apparatus beyond the usual lines of irons, kettles, &c., as with the present rate of 1¼d. per unit, consumers do not avail themselves of the convenience of electricity. A tariff, however, is now to be put forward on the "Norwich" system whereby the average 5-roomed house will work out at about 13s. for the number of "basis" units with all in excess at ¾d.

Worcester (Cape) as one of the small towns, seems very much alive with its 26 stoves and 51 water-heaters at a secondary charge of 1d. per unit. It also has held an exhibition, possesses a showroom, "hires out," repairs, and has an "assisted-purchase" scheme for apparatus.

Pietermaritzburg.—Though at the moment the cooking rate is a flat one of 1½d. per unit, it is hoped to introduce an attractive cheap rate in January next, by which time the very large re-arrangement of the distribution system now in hand will be completed. Energy will then be taken in bulk from the Electricity Commission.

With regard to the makes of stoves in use, while the English and American were first in the market, the Canadian make appears now to be most in demand, principally the "Moffat" and "McClary," largely owing to their light attractive appearance, with their white and black porcelain enamelled exterior and plated fittings (the enamelling also being carried to the interior of the ovens), as against the heavy-looking plain cast-iron English make too closely resembling the old gas stove; in addition to which the price of the latter make is about 15 per cent. higher for a stove with similar conveniences.

The elevated oven is much to be preferred, and a thermometer on the door finds favour, as does also a warming closet; the selling price in Durban for such an outfit with 3 hot plates is about £22.

With regard to hot plates, opinion varies considerably between the open and the closed type, but in this country a type that can be easily and cheaply repaired has a decided advantage, and manufacturers would be wise to aim at designing the element so that the wire can be cheaply sold wound in spiral form ready for the average householder to put into place merely with the aid of a screwdriver or pliers, both for the hot plates and the ovens.

A very suitable substitute has been made use of by a Durban engineer—the generally used porcelain grid in which the spirals of the open type of hot-plate are laid being replaced by fire-brick lining of an ordinary coal stove, the grooves being cut out by a narrow emery wheel, and it has been found that there is not the least tendency to crack and break up as does the porcelain in which the grooves are moulded before baking.

Most manufacturers still seem unable to depart from the practice of putting the terminal connections of heating apparatus much too close to the source of heat; if they would only break away and bring the element wire direct on to the terminals exterior to the oven, or away from the hot-plate, it would be greatly advantageous, as these connections subjected to the confined heat are often a source of trouble.

Generally speaking, the various towns are now realising the necessity of catering for the domestic demand, as exhibitions have been held in quite a few towns, while "assisted-purchase" schemes are much in vogue. There is little doubt that the next 12 months will see large developments on the domestic side.

The Durban slogan: "Get an electric stove and save a Kitchen Boy" might be replaced by one universally suitable: "Don't cook the cook; use Electricity and cook the food!"

The writer ventures to add a few further notes received from a leading electrical dealer respecting the supply of electric cookers for the Durban market:—

Owing to the very progressive policy adopted by the electrical department and the very low prices charged for electricity, coupled with the fact that Durban is a semi-tropical town, very many of the inhabitants have installed electric stoves and accessories, the demand generally being originally for British apparatus.

Previous to the war, approximately 100 electric cookers had been installed, principally of the old "Eclipse" type, which cooker is now not obtainable owing to the amalgamation of the English firm manufacturing them.

Immediately after the war, Durban suffered with most other towns through having got behindhand with its plant and mains. This was rectified very quickly, however, and the demand for electric cookers grew, but this demand was not kept pace with owing to the slow manufacturing methods of the English firms. The cookers, however, that were being exported in those days could only be considered fairly satisfactory owing to the unreliable performance of the hot-plates. This unreliability resulted from several causes, including design and poor workmanship.

The ovens generally were satisfactory. For the years 1920-1924 most types of English stoves were installed, but from 1924 the American type of stove began to be popular, principally due to the fact that it was nicely finished with white enamelled surfaces, and reliable hot-plates.

The sellers of the English stove used old arguments that the American type of stove would not stand the rough handling of native labour, or the sea air—pointing out that the English type was made of cast iron and capable of standing a considerable amount of hard usage. They also used their arguments against the ability to withdraw the elements from the oven and hot-plates easily, pointing out that arcing was bound to occur. In spite of these remarks, the demand for the American type of stove increased by leaps and bounds until to-day the English type of stove is rarely, if ever, sold, and the others are in great demand. Unfortunately it cannot be denied that the reasons for this are:—

(*a*) Heavy type of English stove, which is identical with the gas stove, coupled with the fact that the finish is generally of the crudest possible type, in spite of some of the stoves having enamelled surfaces.

(*b*) The uncertainty of the performance of the hot-plates.

In contrast to this the American stove is attractive in design and appearance and very reliable in operation. The smallest details appear to have been thought out most carefully, making the stoves convenient to work with, as well as labour saving. The hot-plates appear to give almost universal satisfaction. This is not just due to luck, but to the attention that the Americans give to details. The indictment against English manufacturing is a serious one; but judging from the experience of the last 15 years, it is impossible to avoid the fact that the English manufacturers do not appear to test their apparatus adequately, and furthermore, they pay little or no regard to appearance, being quite content to let their electric cookers remain as rough in finish as a fire stove turned out by a small foundry. It is unfortunate that the position is so unsatisfactory, especially as the town of Durban is most intensely British, and would infinitely prefer to order British stoves rather than American.

There is perhaps one piece of apparatus that has proved eminently satisfactory from the English point of view, and that is the kettle. It is somewhat strange that practically all kettles made by British manufacturers are satisfactory and attractive in appearance. The same remark does not apply always to irons. The American iron, as a rule, appears to be more attractive and also more reliable than that of British manufacture.

Electricity in the Swedish Home.

A general survey of the domestic applications of electrical energy and some conclusions to be drawn therefrom.

By ALFRED EKSTRÖM, D.Sc.

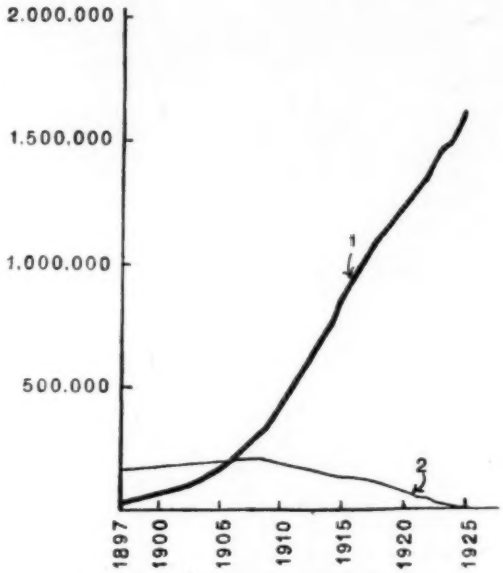
THE use of electricity is very varied in different homes, depending on the economical means at the disposal of the inhabitants, whether situated in town or in the country, and the degree of understanding of the usefulness of the applications of electricity in everyday life. At the moment electric light will be found in most Swedish homes, whether in the towns or in the country: a marked tendency, however, is to be noticed in the introduction of different labour-saving devices which have proved to be practical and economical; no doubt it is only a matter of time before they will be introduced into the ordinary Swedish home.

Electric Light.

In a country like England, where the gas supply is of such dominant importance in the illumination of the home, it is of interest to learn of the development of the competition between gas and electricity for lighting purposes. When the Stockholm electricity works started in 1892, the usual means of lighting were petroleum and gas; petroleum was usually employed in the homes and gas in shops, offices, restaurants, &c. At the same time, a great advance was made by the introduction of incandescent gas mantles. The electric carbon-filament lamp at that time consumed about 4 watts per candle-power, and the price of electrical energy was in the first year more than 10d. per kWh, but in the following year the price was reduced to about 8d. The high energy consumption of the lamps, together with the high price paid for energy, made electric light very dear, the cost being several times as great as that of lighting by gas or petroleum; thus the conditions were very unfavourable for the electricity works, and during the first years they made but little progress. It was not until 1906 that the number of connected lamps rose to 208,000, and thus exceeded the number of gas lamps then used, which was about 202,000. The following year marked the turning-point for gas lighting: the number of gas lamps then reached its highest figure, about 204,500, after which it steadily declined. In the following year, 1908, we have to record an important advance in electric lighting, as the metallic-filament lamp was then introduced to the market. In 1909, the electricity works, by reducing the price of energy to 4d. per kWh, made electric lighting by metallic-filament lamps much cheaper than lighting by petroleum, and thus its advantage was generally recognised and its use rapidly increased, see fig. 1.

As an average use of electricity by a family of five persons, 150 kWh per year may be reckoned. During the last few years the importance of using such light as will not dazzle the eyes has been realised in Sweden. One of the most prominent features of electric light,

which is by no means fully utilised, is the facility with which the home can be suitably wired and switched, so that in passing from one room to another the room being entered can be illuminated conveniently before the lamps in the room being vacated are extinguished, which is a considerable convenience. The introduction of suitable tariffs for the stimulation of the installation of lamps in dark closets and similar places which are only occasionally used, although of minor interest from the point of view of energy consumption, is such a great convenience to the consumer that it should not be overlooked. I must confess that, having been accustomed to the use of electric light for so many years, it is only during the last few months in England, where I have been obliged to use gas for illumination purposes, that



Curve 1 indicates number of electric lamps.
Curve 2 indicates number of gas lamps.

Fig. 1.—Curves Showing Increase in Number of Gas and Electric Lamps Connected by the Stockholm Electricity Works.

I have understood what a real comfort electric light actually is, besides being safe from the risk of explosion and providing a more attractive installation.

Ironing.

Although in Sweden (on account of the difficult servant problem) every housewife tries to reduce the clothes washing done in the house as much as possible and sends the remainder to a laundry, there will always be a good deal of the women's finer clothing to be washed and ironed at home. An electric iron is, therefore, one of the devices which would be found in every home.

A yearly consumption of from 25 to 50 kWh of energy for ironing would be normal for a family of five persons.

Vacuum Cleaning.

Every one who has entered a room wherein a servant is using a broom to sweep the floor, which is covered with mats, must have realised that this way of cleaning means only the removal of the dust from the floor to the furniture, curtains, walls, and the ceiling of a room. The electric suction cleaner is an appliance which, within a few years, will be appreciated as highly as electric light. It will clean not only carpets, but also curtains, chairs, floors, walls, and ceilings, and is also used for dusting. Vacuum cleaners have also during the past years found a very good market.

It is of importance to have a machine with an efficient vacuum. The cleaner manufactured by the Electro-Lux Co., generally used in Sweden, works with a water-gauge of 30 in.: its electromotor consumes 230 watts, and an average family will consume about 75 to 100 kWh a year. The cost of this cleaner is £15 17s. 6d. net. Considering this comparatively high cost for an average family, its rapid introduction into the home is remarkable. It is, of course, mainly due to its labour-saving qualities and convenience, but a contributory reason is no doubt the Company's efficient selling organisation, which allows its customers to buy the cleaners on a deferred-payment system up to 18 months. It has been under the consideration of the electricity works to make arrangements for a hiring system, as these devices introduce a convenient load to the power stations.

Electric Cooking.

It is only a question of time before the electric kitchen will be realised by the average family, provided suitable tariffs of energy for this purpose are introduced. I need hardly enlarge upon the great advantages of the electric kitchen, especially in a house wherein the wife has to do the cooking herself.

An essential condition is, however, to have at one's disposal an effective cooking-plate, allowing for the rapid cooking of the food placed upon it; but this requires a high loading of the plates of the electric range, usually amounting to a consumption of from 5 to 6 kW maximum, which means a heavy strain on the power supply system. Therefore, the Stockholm electricity works have introduced a thermal-storage range loaded to not more than about 500 watts consumed day and night permanently. It has been found, however, that such a range offers so many advantages (such as labour saving and convenience) also to the consumer, that it may be only a question of time before this type of cooker comes into general use in Sweden.

The consumption of energy by a complete electric kitchen is from 1 to 1.2 kWh per person a day. A family of five persons would thus consume about 2,000 kWh a year.

Water-Heating.

Water-heating in Sweden is rather a complicated problem. In most houses several families are living, each having a flat on one floor. Central heating of the rooms with coal is generally adopted for the whole house, and a charge therefor is included in the rent of the flat. At the same time, each family's need of hot water will be supplied from the central system and a charge therefor included in the rent also.

In fact, the scarcity of flats which existed during and after the war now being over, and the great desire for convenience and comfort and to do without servants as much as possible being so strongly established, owners of the older houses lacking central heating have found it necessary to introduce it in order to find tenants. In consequence of this, electrical water-heating in the towns is generally of less interest, but in the case of country dwellings the subject may be otherwise, although even there the same tendency is acknowledged.

Washing Machines.

The intense use of domestic clothes-washing machines in America, for instance, is not emulated in Sweden. The reason for this is, as already mentioned, the difficult servant problem, which forces a family to send out its washing to a laundry in order to reduce the amount, so far as possible, done at home, even at the risk of having its linen subjected to rough usage.

Electric Refrigerators.

Although Sweden is a country where natural ice is easily available and cheap, the convenience of a refrigerator will undoubtedly make it desirable for homes to be supplied with such a device.

The refrigerator used in Sweden is also manufactured by the Electro-Lux Co. Its yearly consumption of electrical energy for an average family will be about 100 kWh, and its load is from 180 or 280, up to 360 watts, according to the season. It requires, however, also from 5 to 7 gallons of running water per hour. When the costs have to be considered, there must thus also be added the cost of the consumption of about 2,000 gallons of running water a year.

The cost of such a refrigerator being £55—a considerable figure for a family—this has been a hindrance to a more extensive use of this device, although the hire-purchase system seems to be doing away with the difficulties which were at first experienced in this direction.

The Heating of Rooms.

On account of the general central heating of dwellings in Sweden, the utilisation of electrical energy for the heating of rooms in homes will seldom be realised. In this respect the conditions in Sweden are not comparable with those in England, with its milder climate.

The Consumption of Energy.

An average family of five persons might thus consume about 500 kWh a head per year:—

Lighting	150 kWh
Ironing	50 ,,
Vacuum cleaning	100 ,,
Electric cooking	2,000 ,,
Refrigeration	100 ,,
Total	2,400

Tariffs.

In this connection I cannot help touching on the important problem of introducing such tariffs as will stimulate an extensive use of electricity. The two-part system introduced in England, with a fixed annual charge for domestic consumers (proportional to the rateable value of the house, for instance, with an additional price per kWh for consumed energy) has been brought in during the last few years, particularly in rural districts, and will no doubt be generally practised.

The importance to the electricity works of a large load factor has, however, been realised, and the Stockholm electricity works have for this reason constructed a special electricity meter for domestic use, working according to the principle of a change-circuit, which promises to be successful. By the introduction of this meter a consumer can subscribe for a fixed bottom-load of, say, 500 watts, covering the capacity of the electric thermal-storage range, which will (without inconvenience) be automatically disconnected when the consumer uses this load for light, cleaner, &c.; 500 watts will thus be rigorously utilised by the consumer day and night, and result in a very high load factor—experience has shown about 75 to 80 per cent. For this load the consumer will be authorised to pay a certain price per kW a year, which, if utilised properly, will result in a price per kWh of about half of the above-mentioned additional price per kWh.

An interesting solution of this problem in England has lately been proposed by Mr. George Wilkinson, of Harrogate, the development of which for Swedish conditions also might be taken into consideration.

Conclusions.

Lastly, I must confess that, considering the development of the domestic use of electricity achieved by some of the leading British undertakings, such as those at Manchester, Glasgow, and elsewhere, I do not consider the results attained in Swedish homes on the whole very remarkable, especially as electric light has been installed on a large scale in town dwelling-houses in Sweden for many years. As a reason for these conditions I may mention the following circumstances:—

(i) Swedish towns generally own electricity works as well as gas works, which fact has proved to be a severe handicap for the development of the electricity supply, especially as regards cooking.

(ii) Municipalities, especially in the larger towns, utilise the profit from their supply of electricity—which is often considerable—not to reduce the power prices and thus stimulate an increased consumption, but to reduce the charges of the taxpayers, thereby giving a false idea of the ordinary expenses of a town's management.

(iii) The management of such a delicate and complicated business as the electrical distribution of power is as a rule (the exceptions prove its validity) more suited to the adaptable and efficient administration of a privately-owned undertaking than to a rigid and expensive municipal *régime*, the inconvenience of which is experienced when an attempt is made to extend electrical enterprise to the surrounding rural districts.

Ultra-Violet Rays in Therapeutics.

The author explains the virtues of "Electricity's Greatest Gift to Humanity," and urges contractors to study this important subject.

By CHAS. A. COOPER.

WE have all been reading in the lay, technical, and medical Press of the great healing virtues of "Sunlight" treatment, or, to be precise, ultra-violet irradiation. A number of pit lads have recently been taken to undergo a special course of treatment in the Alpine sunshine, and every one of them materially benefited thereby. As the ultra-violet rays of the sun can be reproduced electrically, it is obvious that every effort should be made to bring their extraordinary beneficial effects within the reach of all.

Many hospitals are equipped with the necessary apparatus, and medical practitioners are now giving the treatment quite freely, but rapid and vast extension is a crying necessity. Whilst the application of these life-giving rays is certainly not a "cure-all," their usefulness has been definitely and positively established for the treatment of a large number of complaints and diseases.

These Rays Exterminate Germs.

The greatest virtue of the ultra-violet ray is its germicidal and bactericidal property. During the past 20 years a large number of experiments have been carried out, and such results have been obtained that we can now guarantee in advance the number of germs of a given kind that will be exterminated in a given number of seconds or minutes, by exposure to rays of a given volume.

All those troubles that are caused by disease germs can be cured with certainty *if* the germs can be exposed to the ultra-violet rays. For instance, if we could force the rays right into and through the lungs, tuberculosis of those organs could be cured; on the other hand, when disease germs circulate with the blood, the exposure of the naked body to the ultra-violet rays in a course of treatment will kill the germs.

The rays penetrate to nearly 1/16 in. through the skin; the blood in the capillaries and vernules is thus brought under the influence of the rays, and the disease germs are destroyed. It requires truly quite a lengthy course of treatment to completely purify the blood, but the process gives *absolutely positive results*.

The nerves are also undoubtedly most beneficially affected by the action of these life-giving rays, and new tone and vitality are imparted to them. Many cases of

nervous debility will yield to "sunlight" treatment, in which it has been impossible to effect any improvement by any other means.

The Scope of Their Utility.

Since the introduction of this treatment, its outstanding success has been the cure of rickets (rachitis), especially in children. Poor little mites, only just able to crawl about, becoming deformed and helpless burdens both to their parents and to society in general, have been restored to normal health and strength by ultra-violet irradiation. This is, however, but a very minor part of the enormous field of operations with which all electricians who have in their hands the means of generating ultra-violet rays will wish to become more completely familiar.

All tubercular troubles such as diseased hips and glands, &c., absolutely refractory to all other methods, have been relieved and even cured by the action of the ultra-violet rays, and a no less important development has been the treatment and cure of a host of skin diseases such as lupus, psoriasis, eczema, &c.

There are also many other ills that can be successfully treated, but the list is too lengthy to reproduce here; the following, however, is a brief summary of such troubles that are unfailingly benefited by this treatment:—

Anæmia, rheumatoid arthritis, alopecia, asthma, bronchitis, dyspepsia, eczema, lumbago, neuralgia, neurasthenia, neuritis, rheumatism, sciatica, and whooping cough.

Different Means of Treatment.

By the aid of the various apparatus that are now available, treatment can be given for a mere boil, for instance—that is, by "spot treatment"—or for alopecia or swollen glands, which can be termed "local treatment."

In many cases it is imperative to expose as much of the body as possible to the rays, and although this might be given for some specific trouble, it would be called "individual general treatment."

The next step is collective treatment—that is, for a number of patients at one time varying from about 6 to 600, as for miners, for instance, according to circumstances; naturally this collective treatment is employed to enable the patients to obtain the tonic effects of the rays rather than for the cure of disease.

A Matter for Careful Study by Contractors.

The supply and installation of all these electrical apparatus (ultra-violet ray generators) should undoubtedly be confided to electrical experts, and as it is of such universal importance, all contractors should make a point of studying the subject with a view to the extension of their business in this direction, in order to cope with the demand, in co-operation with the medical profession.

Reference has already been made to the wide medical scope for ultra-violet irradiation ("artificial sunlight" treatment), but apart from the cure of disease, there is a far greater field for the use of ultra-violet rays in the home generally.

Particularly during sunless summers and in winter time the wonderful tonic effect of the rays can be utilised in the nursery for ailing children, for instance, and in the bathroom or a room set aside for the purpose, for all members of the family to recuperate, by means of a "sunlight" bath that can be switched on, at will, wherever current is available.

The lamps produce light that is far richer in ultra-violet rays than ordinary sunshine, and therefore it must be described as *concentrated* sunshine, which means that only a small length of time can be spent with the body exposed to the rays of an ultra-violet lamp as compared to the time that one can spend with the body exposed to natural sunshine.

With powerful lamps, the exposure at close range is for as short a period as 30 seconds; but with units of lower power 15 to 20 minutes' exposure can be given, and even more under certain conditions.

Electricity and Ultra-Violet Rays.

Apart from natural sunlight, there is but one practical way of generating ultra-violet rays, and that is by means of an electric arc. Ordinary carbons have been used, but their output of ultra-violet rays is almost negligible, and this is a point of vital interest both to the contractor and to the user—it can discredit the one and be useless to the other.

Whatever unit or generator may be employed, the user must be quite certain not only that ultra-violet rays *are* produced, but also that they are present in sufficient volume, and therefore, just as a 50-watt lamp must be as described, so must the "sunlight" lamp generate ultra-violet rays to give satisfaction and to comply with medical requirements.

There are three definite electric arcs that *do* generate ultra-violet rays in sufficient volume to be of therapeutic value:—

1. Those with *metal-cored* carbons, the cores containing either tungsten, iron, nickel, or a mixture of various metals.
2. The pure tungsten arc which, however, can only be used on direct current.
3. Mercury-vapour in vacuum quartz burners.

All three means are good in their respective ways, but they have limited and distinct *rôles* in actinotherapy.

The metal-cored carbons offer the line of least resistance—lowest cost, easily adaptable, and easily used—and they are perfectly satisfactory for *all* purposes, including low-power units for home use, and higher-power ones for medical and hospital use on both direct and alternating currents.

Automatic functioning is, of course, desirable, and the cost of these ultra-violet ray generators is modest.

Pure tungsten gives a richer and greater volume of rays, but as this metal will arc only on direct current, it can only be considered when that nature of current is available, and should only be recommended when the future supply is assured.

The mercury-vapour arc lamp is often preferred because of the enormous volume of ultra-violet rays produced by it, and for this very reason its use must be restricted, because "dosage" becomes all-important and medical advice, prescription, and expert supervision of the treatment are indispensable.

Mercury-vapour quartz burners are suitable for both direct and alternating currents, and are economical in use.

Unless the ultra-violet ray generator is competently prescribed, it should always be ascertained that the proper unit is supplied for the specific purpose for which it is intended.

Energy Consumption.

Users nearly always wish to know the energy consumption, and this information can be readily furnished from the following data:—

Small apparatus with metal-cored or impregnated carbons take 45 to 50 volts across the arc and about 5 amperes; on a 110-V circuit only half a unit is consumed per hour, and about a unit on 220 V.

Ordinary tungsten arcs are about the same, and in both cases the necessary resistances cause a loss of energy, which, however, is unimportant in view of the small volume.

The mercury-vapour burners are more economical, although, as compared with the low cost of carbons, the quartz burners are very expensive and have but a limited life.

Roughly speaking, a quartz burner will light on about 4 to 9 amperes with 25 volts across the arc. As the burner warms up, much less current is taken, and the voltage increases across the arc to as much as 175 V, full power being obtained with 2½ to 3 amperes.

Greater amperage is required on alternating current, and with lower voltages a lesser volume of ultra-violet rays is generated. It will be seen, however, that the energy consumption is very low, and is even less than with carbon and tungsten arcs.

D

It is evident that the energy consumption with all classes of ultra-violet-ray lamps is so low that it cannot possibly prove to be a deterrent to their use.

Practical Points of Interest.

Ultra-violet rays, whatever their source, are not only *invisible*, but have most feeble powers of penetration, and they are dissipated far more easily in the atmosphere or otherwise than light and heat rays. Natural sunlight loses all its beneficial effect, except warmth, when passing through an ordinary glass window, and whilst plants thrive because of the light and warmth in greenhouses and conservatories, the ultra-violet rays are excluded. This must be borne in mind when installing apparatus; it is the reason why mercury-vapour burners are made of quartz (pure rock crystal), which, as a transparent material, alone allows the free passage of the ultra-violet rays, although special glass is now available that permits the passage of some 60 per cent. of them.

The production of sunlight artificially and its use in therapeutics, as well as for the tonic effect, should certainly be a matter for earnest consideration not only from a humanitarian point of view, but also for prosperous trading without neglecting to-day's slogan: Buy British!

Modernising Radio Receivers.

Some hints concerning the remodelling of broadcast radio-telephone apparatus; methods of improving reproduction and operation by the substitution of modern components for the older patterns.

By W. JAMES.

THE British experimental broadcasting station at Daventry (5GB) has been working for a sufficient length of time to enable listeners to learn that it provides an acceptable alternative programme which can be received by means of a quite ordinary receiver; but some listeners have found that their sets are not sufficiently selective completely to eliminate the local station when they are tuned to Daventry, or, in the case of those listeners who have 5GB as their local station, that it is not readily tuned out.

It has to be admitted that many of the receivers used fail to possess the necessary tuning ability, which is sometimes due to the circuit of the set, but more often to the use of unsuitable coils. An ordinary two- or three-valve set, comprising a rectifier with low-frequency amplification, usually consists of a single tuned circuit with reaction. This, in many instances, does not provide the necessary tuning characteristics, for many of the plug-in coils used have a relatively high resistance. Great improvement can nearly always be effected by removing the plug-in coils and fitting more efficient ones of the single-layer type; the latter form of coil can readily be tapped for the aerial connection, which not only improves selectivity, but also increases the signal strength. The reaction control, too, can be arranged in a much better way when the single-layer tuning coil is employed, for it is only necessary to wind a second coil of a few turns a short distance away from the aerial coil and to use a variable condenser for controlling the reaction.

The accompanying diagram (fig. 1) gives the connections of a three-valve receiver having a tuner which is much better than the usual plug-in coil type. For the lower broadcast wave-lengths the aerial coil may have 55 turns of No. 20 d.c.c., with a tapping at the 10th turn on a tube 3 in. in diameter; a winding of 15 turns of No. 30 d.s.c. put on in the same direction as the aerial coil and ½ in. from it, will usually be satisfactory for reaction. The set will therefore have two variable condensers mounted on the panel.

When a big change in the tuning arrangements of an existing receiver cannot be made, one of the better types of plug-in coil provided with a centre tap, such as the "Lewcos," can be used. The aerial can then be connected to the centre point of the coil and, if this does not provide sufficient selectivity, a fixed condenser of 0.0001 mfd. can be connected in the aerial lead. If this combination of series aerial condenser and tapped coil does not provide sufficiently good tuning, then a wave-trap will have to be connected. This may comprise a good single-layer coil and a 0.0005-mfd. variable condenser; one end should be connected to the aerial wire in the set and the aerial itself joined to a tap on the coil.

The diagram includes the connections of a modern low-frequency amplifier: it will be seen to comprise resistance-coupled and transformer-coupled stages. Many of the receivers now used have components which may have been the best obtainable at the time the receiver was purchased, or made up, but great improvements have lately been made in the deisgn of components of low-frequency amplifiers. Referring to

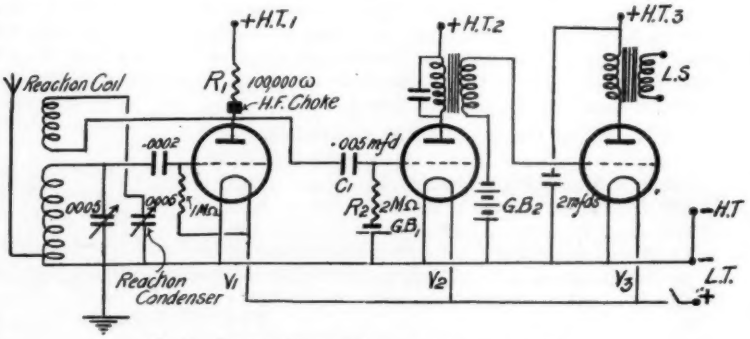


Fig. 1.—Receiver Diagram Incorporating Improved Tuner.

the diagram, anode resistance R_1, coupling condenser C_1, and grid leak R_2 may be one of the new R.I.-Varley couplers, or when it is preferred to use separate parts, R_1 may be a 100,000-ohm anode resistance, C_1 a 0.005 mfd. coupling condenser, and R_2 a 2-megohm grid-leak. The high-frequency choke is not always necessary, but in many instances is desirable, as it tends to prevent high-frequency currents passing into the low-frequency amplifier. If the l.f. transformer shown in the next stage be of the Ferranti AF.5 type, and the valves used are suitable ones, the amplification-frequency characteristic of the complete amplifier will be very nearly perfect. Connected to the output valve is a transformer, which is used to protect the loud-speaker and is very necessary when a power valve is employed in the last stage. A choke-capacity isolating circuit is often used instead, but the difficulty is to find a good choke coil, for if it has too low an inductance the notes of low frequency will not be amplified to the same extent as those of higher frequency.

The accompanying circuit is reproduced as a guide,

because it is thought that many listeners will have their receivers remodelled when once they realise the advantages of using modern components. It is, of course, very important that valves suitable for the couplings be used: V_1 should be of the resistance-capacity type, V_2 of the type having an anode impedance of about 20,000 ohms, and the valve in the output stage (V_3) of the power or super-power type. Many receivers fail to amplify properly because correct valves are not used, and particular attention should always be given to the output stage; the valve in this position must be of the power type and be used with ample anode voltage and grid bias if distortion is to be avoided.

Many manufacturers supply high-voltage anode-battery eliminators which have been proved by experience to be reliable articles, while valve makers in most instances supply valves for working off domestic alternating-current mains. It is, therefore, possible to run a set directly from the mains, no filament or anode batteries being required. A step-down transformer is used with these valves, which component has to be carefully designed, for the voltage applied to the set must remain fairly constant regardless of the number of valves used. For this reason some makers, such as A. C. Cossor, Ltd., provide a transformer with tappings; it is then quite easy to adjust the voltage of the current supplied to the valves.

When a receiver is to be fitted with the new a.c. valves it is most important so to arrange the wiring that hum is not introduced. Sometimes the position of the filament transformer may be the cause of a hum, and often it is necessary to employ a potentiometer connected across the heater terminals with the sliding contact connected to the cathode. The primary winding may be connected to a convenient lamp socket, but it would be better to wire it through a switch to the fuse box, remembering that the length of the wires from the secondary winding to the set should be as short as possible. Valves of this type take a heating current of about one ampere, so that the voltage across the valve filaments will vary appreciably with the number in use if the leads have much resistance.

A battery eliminator for furnishing the anode current has much to recommend it; quite apart from the convenience of an eliminator, as compared with dry batteries, the quality of reproduction is usually maintained longer and better, for most dry-cell batteries are apt to develop a high internal resistance which provides a coupling between the circuits of the receiver and tends to spoil the quality. When an eliminator is used, it becomes practicable to employ a super-power type of output valve, as the eliminator will supply the relatively heavy anode current required without difficulty; but it is not safe to connect a loud-speaker directly in the anode circuit of such a valve; it is better to use an output transformer, which may have a ratio of one to one when the loud-speaker is of the usual high-resistance type of from 750 to 2,000 ohms.

The use of a transformer is often recommended when loud-speaker points are fitted in several rooms, but it must be remembered that a transformer having a one to one ratio will be just as sensitive to shunting capacities formed by lengthy leads as the high-resistance loud-speaker itself would be were it connected directly in the anode circuit of the valve. For this reason it is advisable not to wire speaker extensions with twin cable. One could, in fact, earth one terminal of the secondary winding of the transformer and run one wire to each extension point, earthing the second terminal of the extension lead. By these means an earth return is used, but the writer would sooner use two separate wires rather than one wire and an earth return. When loud-speaker extensions are used, it is fairly easy to fit a device for automatically switching on the set. This is a convenience which is often greatly appreciated, and involves the use of a simple type of relay. The "Lotus" remote-control (Garnett, Whiteley & Co.) is an example; it is easily and cheaply fitted.

Modern receivers are usually capable of so much magnification that the necessity for a big aerial no longer exists; indeed, very often quite a small aerial is more suitable, for its use will make it more easy to eliminate the local station when attempting to receive more distant ones. The need for good insulation is generally appreciated, and it always pays to use a good earth.

The Domestic Storage of Energy.

Some notes upon the improvement of load factor by heat storage at night, with particular reference to progress in Switzerland.

By L. G. A. SIMS, M.Sc. (Eng.).

ATTENTION has been drawn several times recently to the possibilities which exist in the encouragement of a night-time domestic load, particularly a water-heating load; but how great those possibilities are does not yet seem to be appreciated in this country. It is, of course, well known that the big difference between the day- and night-time loads on most power stations is not economic, and that, to reduce that difference, it is generally profitable to offer energy at reduced rates for such purposes as late shop-window lighting, illumination of signs, &c. Such efforts to improve load factor are excellent in their way, but they do not go far enough. The writer, after investigating this question in Switzerland recently, is of the opinion that a far more profitable scheme is to encourage the heating of water at night electrically. This system of utilising energy at a time when most supply engineers in this country cannot at present sell it, is spreading rapidly in Switzerland and is being adopted in other Continental countries.

Conditions in the Swiss town of Basle may be taken as a good example of what has been done. Basle is the home of a thriving industry making electric water heaters and automatic time switches, which may possibly account for its being one of the most highly developed of the Swiss towns in respect of this heat-storage system. It has a population of 145,000. The first water heaters were installed there in 1916-17, mainly because coal was scarce and dear on account of the war. Table I shows the number of heaters and the kW capacity installed between late 1915 and August, 1926.

These heaters work between the hours of 10 p.m. and 6 a.m., and are controlled by automatic time switches. In the larger sizes the energy is metered, sometimes in conjunction with a two-rate meter, but in all cases the operation is controlled by a time switch. For the smaller heaters the Basle electricity undertaking has in force a flat rate. The actual charge is 4 francs per month (about 3s. 2½d.) for the 6½-gallon size, and 6 francs per month (about 4s. 9½d.) for the 11-gallon size. The time switch which brings in the heater automatically at the hour when the cheap tariff applies is hired to the consumer by the electricity works. The

charge for night power to the larger heaters is generally 4 centimes (about ⅜d.) per unit, falling to 2 centimes (less than ¼d.) per unit for a certain period at the week-end. The rate of ⅜d. for this purpose is the figure which the Glasgow Electricity Department has been able to quote for a similar type of load, and so it can be seen that the advantages of the system might be realised here.

TABLE I.

kW	Number.	capacity.
Small water heaters of 6½ and 11 gal. capacity	1,671	825
Larger water heaters of 16½ to 440 gal. capacity	1,864	7,375
Total ...	3,535	8,200

TABLE II.

BASLE LOAD CURVES (Fig. 1).

	1915.	1924.
Load factor	56%	74%
Maximum kW	8,200	17,600
Time of max. kW	5.30 p.m.	4.40 p.m.
Minimum kW	2,100	10,500
Time of min. kW	2.30 a.m.	12.45 p.m.
Ratio $\frac{\text{max. kW}}{\text{min. kW.}}$	3.9	1.68
B.O.T. units/day	110,500	312,000
% increase in load factor ...	18	—
% increase in maximum kW	114.5	—
% increase in minimum kW	400	—
% increase in B.O.T. units/day	182	—

peak" load in the way described. Fig. 1 shows two load curves for Basle. Curve B was taken on a winter's week-day in 1915, that is, shortly before any water heaters were installed. Curve A was taken on

TABLE III.

GENEVA LOAD CURVES (Fig. 2).

	December, 1922.			December, 1925.		
	13th	14th	15th	16th	17th	18th
Load factor	47·6%	46·2%	46·7%	53·7%	51·8%	49·8%
Mean		46·8%			51·7%	
Max. kW. ...	15,400	15,700	15,000	16,000	16,000	16,600
Time of max. kW.	5.30 p.m.	5.30 p.m.	5.30 p.m.	5.30 p.m.	5.30 p.m.	5.30 p.m.
Min. kW. ...	3,500	3,500	3,500	5,100	5,000	4,900
Time of min. kW.	5 a.m.	5 a.m.	3 a.m.	5 a.m.	5 a.m.	5 a.m.
Ratio— Max. kW. / Min. kW.	4·4	4·5	4·3	3·14	3·20	3·39
Mean B.O.T. units/day	166,700				193,500	
% increase in mean load factor ...	4·9				—	
% increase in mean max. kW. ...	5·4				—	
% increase in mean min. kW. ...	42·8				—	
% increase in B.O.T. units per day ...	16·1				—	

a corresponding day in 1924. It will be seen that in 1915 the load fluctuated between upper and lower limits of 8,000 and 2,000 kW, approximately, the maximum being thus four times the minimum. In 1924

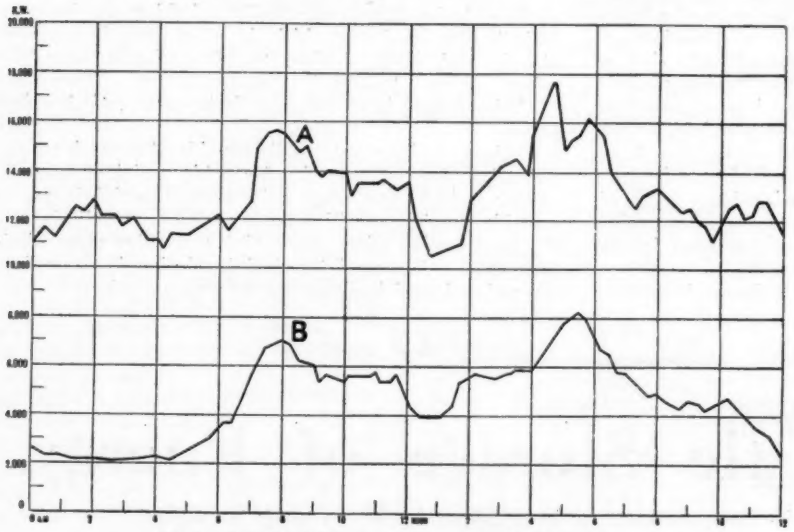


Fig. 1.—Basle Load Curves, with and without Water-heating.

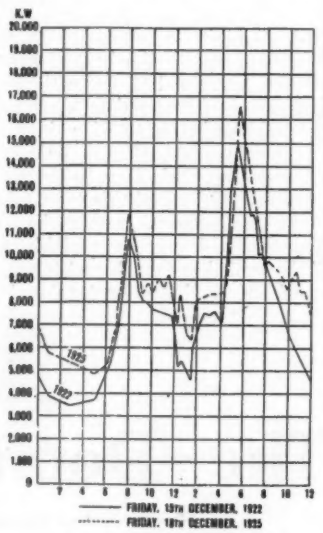


Fig. 2.—Geneva Load Curves.

But if this system of heat storage of cheap energy is attractive to the consumer, it is still more attractive to the supply authority. Consider the case of Basle. As shown in Table I, there is a total water-heater capacity of 8,200 kW at present installed. Assuming that all the heaters are switched on for the full eight hours at night (10 p.m. to 6 a.m.), and current costing 0.04 franc per unit, we see that the Basle electricity undertaking derives an income of $(8{,}200 \times 0.04 \times 8)$ francs, or 2,624 francs (about £105) per day, which, without the water heaters, it would not have. Probably the actual figure is about £75 per day, as all the heaters do not run the full eight hours per night. Allowing for this and for the variation of demand as the seasons change, the income derived from this source must certainly exceed £15,000 per annum; and this income is earned without installing any additional generating plant or cable network, but just by using the existing plant at night when it would otherwise be almost idle.

These figures are not peculiar to Basle, although it is at present the most highly developed case. A remarkable improvement in load factor has resulted wherever electric water heating has been encouraged, particularly when this has been treated as an "off-peak" load in the way described. Fig. 1 shows two load curves for Basle. Curve B was taken on a winter's week-day in 1915, that is, shortly before any water heaters were installed. Curve A was taken on a corresponding day in 1924. It will be seen that in 1915 the load fluctuated between upper and lower limits of 8,000 and 2,000 kW, approximately, the maximum being thus four times the minimum. In 1924 these limits were 17,500 and 10,500, and the maximum was thus only just in excess of 1½ times the minimum. This was a wonderful result, which was very largely due to water heaters. As the installing of heaters has been proceeding apace since 1924, the results are almost bound to be still more favourable now. It is not surprising, therefore, that supply authorities in Switzerland, without any exception, are giving every possible encouragement to the installation of these heat-storage systems.

Fig. 2 shows the beginning of the improvement in the load factor of Geneva, where the first water heaters were installed only three years ago. The analyses of figs. 1 and 2 are given in Tables II and III, and it will be seen that, already, an improvement of 5 per cent. on the 1922 load factor has been effected. At the present time electric water heaters are being installed in Geneva at the rate of some 60 per week, and it is therefore probable that the improvement in load factor will soon be comparable with that of Basle. It is interesting to note that one effect of the water-heating load in Basle has been to change the time of minimum load from the early morning hours to a short period at mid-day.

(To be continued.)

Electric Fires for the Home.

Models for all Tastes and Pockets.

IF there is one thing which distinguishes electric fires from their gas predecessors (apart from their obvious advantages) it is their almost infinite variety. Even in this age of standardisation such a circumstance is not a sign of wasted energy, for unlike cookers and water heaters, in which efficiency is almost the only consideration, electric fires must be made to appeal to a wide variety of tastes and predilections, to say nothing of incomes. As a consequence the makers vie with one another in an endeavour to produce fires which will combine beauty with efficiency at the lowest possible price; each, however, making a few patterns for those people who are able to ignore expense in their search for the artistic or elaborate. It is impossible in this issue to deal with the hundreds of fires which are available, and so we have chosen a few examples which we consider will appeal to the public most.

Among the leading British electric fire manufacturers are Messrs Belling & Co., who employ a special type of fire-bar known as the "Multi-Parabola." The surface of this is divided into numerous parabolic wells which ensure efficient radiation. One of the numerous patterns of "Belling" fires which embody this type of bar is shown in fig. 1. This is an ornate three-bar model (the "Casket") with a polished aluminium body and a total loading of 1,800 W. In accordance with the firm's practice, "M.K." foot-press switches are fitted which enable one, two, or three bars to be used. A fire of a cheaper and simpler nature is the "Hearth" fire illustrated in fig. 2. This is of the imitation coal type, and a realistic effect is obtained by threading the spiral heating wire through fireclay shaped and coloured to represent burning coal or coke. It has an art-black and rustless-steel finish, the loading being 2,000 W.

Another company which specialises in this direction is Electric Fires, Ltd., Norwich. Many "Heatrae" fires employ hammered copper reflectors such as are seen in the two examples illustrated. Fig. 3 depicts the "Corona," a fire of very neat appearance and easily portable (it weighs 12 lb.). The two firebars (1,000 W each) are arranged horizontally at the base of the reflector, and they are protected by stout cross bars upon which a kettle can be placed. Four finishes are available and two-heat switching is provided. The "Rameses" pattern shown in fig. 4 is a dual fire, there being two separate reflectors each housing a 1,000-W firebar of the company's easy-replacement type. There is no doubt that the copper-reflector type of fire has a very cheerful appearance and goes far to overcome the prejudice against electric fires engendered by the absence of the "blaze" which distinguishes the coal fire.

A fire of somewhat novel design is shown in fig. 5. This is the "Angelus" tilting bowl fire made by Messrs. Chas. Joyner & Co. It is of delicate appearance, although substantially constructed, and its 750-W element makes it quite a useful appliance for local heating. The element is easily removed without the necessity of unfastening screws. Oxidised copper or silver finishes are provided; in the latter case the bowl is nickel plated. Another "Angelus" fire, suitable for bathroom or bedroom use, is the model depicted in fig. 6. This is of simple cast-iron construction with a 1,000-W firebar. Keyway holes are provided in the back to enable the fire to be mounted on a wall. There are three finishes—black, brown, and white.

A range of "utility" fires is made by Metro-Vick Supplies, Ltd., one of which appears in fig. 7. This is an improvement upon a previous design; a new type of heating element is fitted, and a top shelf is provided which can be used for warming plates, &c. There are two 1,000-W elements, one of which is separately switched. The fire is finished in white vitreous enamel and chromium plating or oxidised copper and lacquer. Fig. 8 illustrates one of the "Cosmos" small pedestal heaters fitted with a 12-in. hammered copper bowl. An ebonised carrying handle is fitted.

A fire suitable for installation in a large open fireplace is the "Xcelcoal" model supplied by Siemens Electric Lamps & Supplies, Ltd. (fig. 10). This takes the form of a brazier of imitation coal with simple ornamentation, in the front of which are fitted two 1,000-W firebars. At the back is a polished copper reflector which enhances the glow emitted from the "coal." The body is finished in art black relieved by oxidised copper embellishment.

Another "Siemens" fire of elegant design is that shown in fig. 9. This employs the principle of reflected heat from concealed elements. The red glow from the hand-hammered copper reflector gives the realistic appearance of a coal fire. The standard finish is in "coinage bronze," with laid-on solid brass ornaments. The fire has a loading of 2,500 W.

A design which has become popular within the last year or two is the "screen" fire which serves a dual purpose. In winter it is a useful heater, while in summer it can be used to hide an empty fireplace, which is never an inspiring sight. The fire illustrated in fig. 11 (Credenda Conduits Co., Ltd.) is typical of this sort of heater. This consists of a handsome screen in antique brass or oxidised copper or silver, in the centre of which is a polished bowl containing a 600-W plug-in element. The overall dimensions are:—Height 31 in., width 22½ in. Another "Credenda" fire is the "Jewel" (fig. 14). This is a severely practical design with a grey-finished cast-iron body and two 1,000-W firebars. A lifting handle forms an integral part of the main casting.

Messrs. May & Padmore, Ltd., have produced an attractive range of fires. These are made in varying sizes, from a small portable fire, suitable for small rooms, to a large Jacobean model with a maximum loading of 3,750 W (fig. 13). The company's imitation coal fires are designed to represent mediæval grates, and the heating elements, which are of the "Gloform" non-metallic type, are ingeniously concealed. The heat is projected forward into the room by means of a highly-polished copper reflector. The glow from the elements is augmented by the provision of two 30-W electric lamps. The lamps are controlled by separate switches. In all "Maymore" fires the elements are instantly interchangeable. In the case of the "Gloform" elements, they are simply pushed into conveniently placed clips.

Two examples have been selected from the products of the Edison Swan Electric Co., Ltd. The first (fig. 12) is the "Dome" fire, a decorative, portable type. It is of smooth refined outline with a finish which harmonises with any interior colour scheme. There are two patterns—the three-bar (2,250 W) and the four-bar (3,000 W). As with all "Ediswan" fires, an earthing terminal is provided. The other fire is the "Raymond" model (fig. 16). This has two 1,000-W bars, of the plug-in type, fitted at the foot of a polished embossed-copper reflector. The guard is mounted on swivel pins, which makes the elements easily accessible. Three finishes are provided—oxidised brass, copper, or silver.

The "Inventum" fires (Mr. Alan Wright) are equipped with an element of a special pattern which employs the least possible amount of porcelain, but is designed to prevent sagging. This element is fitted in a reflector of parabolic cross-section, being arranged along the focal axis. Upon this method many models

Fig. 1.—The Belling "Casket" Fire.

Fig. 2.—The Belling "Hearth" Fire.

Fig. 3.—The "Corona" Fire.

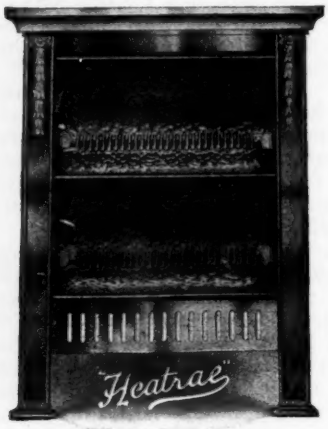


Fig. 4.—The "Rameses" Fire.

Fig. 5.—An "Angelus" Bowl Fire.

Fig. 6.—An "Angelus" Bathroom Fire.

Fig. 7.—An M-V. Utility Fire.

Fig. 8.—A "Cosmos" Pedestal Heater.

Fig. 9.—The Siemens "H. 1461" Fire.

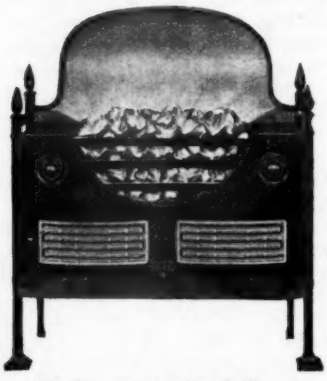


Fig. 10.—The "Xcelcoal" Fire.

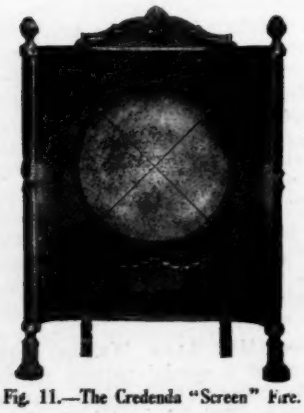


Fig. 11.—The Credenda "Screen" Fire.

Fig. 12.—The "Dome" Fire.

Fig. 13.—A "Maymore" Imitation Coal Fire.

Electric Fires for the Season.

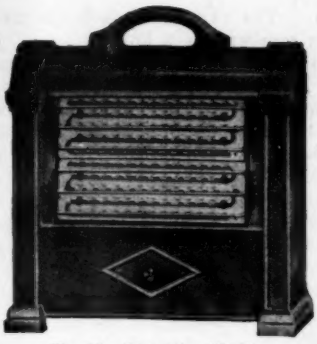


Fig. 14.—The "Jewel" Fire.

Fig. 15.—An "Inventum" One-bar Fire.

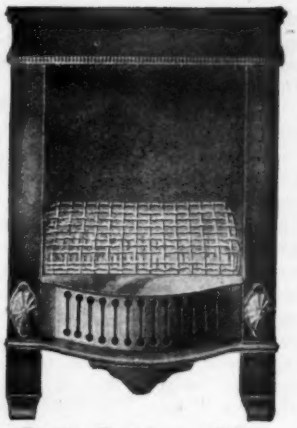


Fig. 16.—The "Raymond" Fire.

Fig. 17.—A New "Carron" Fire.

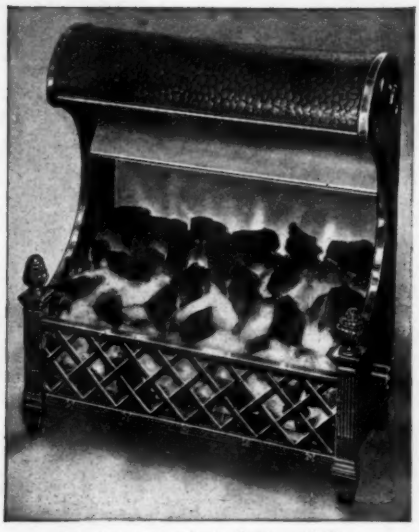


Fig. 18.—The "Louis Newberry" Fire.

Fig. 19.—The "Kangaroo" Fire.

Fig. 20.—A Verity "Adams" Model.

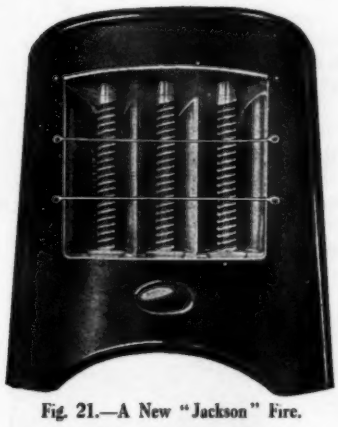


Fig. 21.—A New "Jackson" Fire.

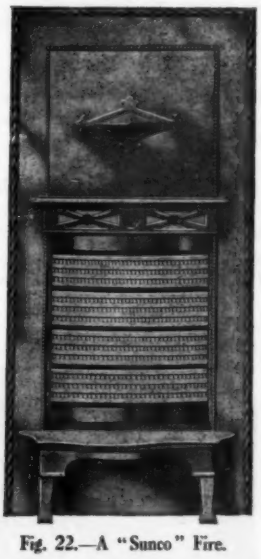


Fig. 22.—A "Sunco" Fire.

Fig. 23.—A Verity "Reflectofire."

Fig. 24.—An "Elescoal" Fire.

Fig. 25.—The "Berkeley Junior."

Electric Fires for the Season.

of fires are built up. Fig. 15 shows a single-bar design in which the element has a 500- or 750-W loading. The reflector is mounted in a frame with a crystalline brown finish.

"Magicoal" fires are known in all parts of the world, particularly in the United States, where they have proved very popular. Messrs. Berry's Electric, Ltd., the patentees and makers, have introduced a new type, the "Louis Newberry," which is shown in fig. 18. This has an improved fire effect incorporating "living flames" 4 in. high. The heat is projected downwards and horizontally into the room by a double-sided parabolic reflector, which is situated out of sight in the canopy of the fire. The heating element is of unique design, having a central core with three separate windings upon it and with specially-designed contacts, so that two or three can be used in parallel as desired. The "Kangaroo" fire (fig. 19) is a portable pattern made by Messrs. Berry's Electric, Ltd. This employs a similar element, and the reflector is arranged to send out the heat horizontally. The fire has a double back, which remains cool even when the full heat is on.

Fig. 21 shows one of the newest products of the Jackson Electric Stove Co., Ltd., and is representative of a complete new range of fires of varying finishes in one-, two-, three-, and four-bar models. The very accessible element is of the plug-in type, with 750-W loading. The rods through the centre of the formers, the terminal stampings, screws and washers are all made in an alloy which will withstand high temperatures without scaling. The smallest fire, containing only one element, is arranged to form a useful heater for boiling small quantities of water, &c. These fires are all constructed of sheet metal, the general finishes being black, antique brass, oxidised copper, and oxidised silver. The reflectors are finished in polished brass or nickel plate according to the general finish.

A special feature of some of the fires produced by Messrs. H. W. Sullivan, Ltd., is a device for moving one of the bars into a horizontal position to enable water to be heated. One of these fires is shown in fig. 26, which illustrates the "Bon" fire. There are two 750-W bars controlled by separate switches, and by means of the handle seen at the side, the top element can be turned over to a position beneath the top grill, upon which a kettle can be placed. Fig. 27 depicts another Sullivan fire, the "Lusta" screen type. This is fitted with a single 1,000-W element which can be covered in

Fig. 26.—The "Bon" Fire.

Fig. 27.—The "Lusta" Screen Fire.

by a plate affixed by means of two screws. It is produced in satin brass or antique brass, copper or silver.

The fire catalogue of the Sun Electrical Co., Ltd., embraces the products of a number of manufacturers, but among the special "Sunco" patterns is the fire illustrated in fig. 22. This is described as a Tudor model, and is designed for fixing permanently in an existing fireplace. It is fitted with four 500-W bars, with heat-control switching. The carcase is made of fine-grade cast-iron with an armour bright finish.

Another fire of the imitation coal variety is the "Efescoal" "Villa" model shown in fig. 24 (Messrs. Falk, Stadelmann & Co., Ltd.). This has two separately-switched 750-W firebars fitted at the base of a curved reflector. The lamp giving the flame effect is connected straight to the supply. The fire is made with old brass or oxidised copper finishes.

Messrs. Veritys, Ltd., produce an interesting range of fires of distinctive design. The fire illustrated in fig. 20 is an "Adams" model with a single 1,000-W bar. The metal front is toned, leavi g the ornament in relief,

Fig. 28.—The "Companion" Fire.

Fig. 29.—The "Utility" Fire.

and harmonises with the polished aluminium sides. This fire weighs only 8 lb. Fig. 23 shows one of the company's "Reflectofires." This is the intermediate one of three sizes—the two-bar (2,000 W). It has an oxidised copper front and aluminium sides, the reflector being of hammered copper.

One of the latest designs produced by Carron Company is the "No. 271" fire illustrated in fig. 17. This is of substantial construction and fitted with two 1,000-W fire-bars. It is 23¼ in. high, 14¼ in. wide, and weighs 32 lb. The finishes available are armour bright, electro-bronze and oxidised silver.

Premier Electric Heaters, Ltd., makes a very attractive range of fires, specialising in the reflector type, an example of which is illustrated in fig. 25. This shows the "Berkeley Junior," a small ornate fire fitted with two 750-W elements placed horizontally at the foot of a solid copper reflector. The finishes available are copper-bronze, oxidised silver and antique brass. The fire is equipped with a grid, upon which a kettle or saucepan can be placed.

We illustrate two new designs produced by the Cable Accessories Co., Ltd. The first (fig. 28) is the "Companion" fire, in which four screw-in type 600-W elements are fitted at the base of a curved copper reflector. The guard enables small vessels to be placed over the elements. Fig. 29 shows the "Utility" fire, in which two screw-in, 600-W elements are employed. The semi-cylindrical reflector is mounted on a cast-iron stand and can be placed horizontally for water-heating or similar purposes. The finish of the reflector is copper and nickel plate; the stand is of dark bronze finish.

The elements are protected by a strong wire guard, which also serves for a kettle stand. An outstanding feature of the fires is the easily-replaced element.

Electric Cooking.

A review of recent developments in the design and construction of electric cookers, with some indications as to the probable trend of future progress.

AFTER the rush of a year or so back to produce new designs of electric cookers, the apparent slowing-up in the introduction of any radical changes in the construction of such apparatus during the past few months may suggest, at first sight, a state of stalemate. On looking further, however, and noting the claims of increased efficiency put forward by the manufacturers, it will be realised that progress has not been impeded and that attention has been concentrated on improving the details of the established designs.

The development of the boiling-plate element is, of course, the most outstanding feature of the progress of recent years. It meets more nearly the views of the contractor, the supply engineer, and the cook, while, from the point of view of the engineer, it is accessible and is not liable to the frequent breakdowns of the past. It is interesting to note that the semi-enclosed element of the JACKSON ELECTRIC STOVE CO., LTD., has met with the success anticipated for it, and that except for one or two minor improvements it is to be standardised as before in the new models. The enamelled hob supplies a long-felt want, and the enamelling of the hobs of the

Fig. 1.—A "Jackson" Cooker.

Jackson cookers is made to withstand the hard wear and tear of cookers used for commercial purposes as well as the domestic type. Fig. 1 shows one of the latest Jackson cookers. The developments claimed for the new models are: marked improvement in the efficiency; the accessibility of all parts; and the elimination of dirt traps.

From the inception of its range of "Revo" cookers, the CABLE ACCESSORIES CO., LTD., has held the opinion that the non-rusting oven interior was a feature which, from being an extra, would develop into standard practice. In the light of recent developments, this would appear correct. The cleanliness and hygiene of an electric-cooker oven are not, it is claimed, fully presented to the public except through the medium of a porcelain enamelled or similar easily cleanable interior. It is a short step to a similar hob. Plating is claimed to have not fully met the need, and the makers have found from experience that the porcelain enamelled hob has justified its adoption by its durability and cleanliness.

The tendency to finish other portions of the electric cooker with vitreous enamel will, the makers claim, develop. The white enamelled door panel and the clear, durable enamelled switch indication panels, as now fitted to "Revo" cookers, are examples. These features are not supplied as extras, but as standard practice. Enclosed-type boiling plates are stated to hold the field on the ground of combined reliability and efficiency, and there, it is claimed, they will remain in favour pending the development of an equally reliable open type of plate—necessarily vastly different from anything that has so far been evolved. Fig. 2 shows the

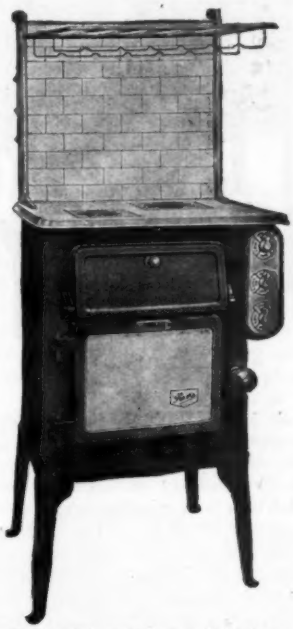


Fig. 2.—The "Maisonette" Cooker.

"Maisonette," the company's most recent model, which was designed specially for housing schemes. Its introduction was marked by its adoption for the L.C.C. Castlenau housing estate.

While little has been done recently in the way of marked alterations to the "Magnet" cookers of the

Fig. 3.—"Hotpoint" Model, showing Removable Oven.

GENERAL ELECTRIC CO., LTD., the development of certain details, it is claimed, has resulted in adding considerably to the qualities of the cooker. The company has made a strong point of accessibility of the various parts, and it strongly supports the view that the elements must be easily detachable and replaceable.

Another important advance is to be found in the introduction of the totally enclosed boiling plate. Mechanically, this type has always been, it is claimed, the more desirable, but until it was possible to overcome the difficulty of slow boiling, which used to be a feature of the enclosed type, open-coil boiling plates were used. Now, however, we understand that the company has developed and will shortly incorporate a totally enclosed type which is more efficient thermally than the open type, and which is remarkably quick-boiling, a quality which is reasonably demanded by the housewife and the cook.

Fig. 4.—"Xcel" Table Cooker.

The Hotpoint Electric Appliance Co., Ltd., is now fitting to its cookers either the latest "L" type radiant boiling plate, which may be loaded to 1,500 or 2,000 watts, or a new totally enclosed boiling plate, No. E.1,668, which has a maximum loading of 1,500 watts.

The grills of the Hotpoint-Falco cookers are now controlled by three-heat switches, and on many models fall-down doors are fitted to the grilling chamber, thereby enclosing this for use as a hot cupboard or for dealing with such foodstuffs as milk puddings when the switch is on low-heat. The hobs may be supplied in vitreous enamel with either blue-black or French-grey finish. The Nos. 5,279, 5,279a, and 5,280/1 cookers may now be obtained with the makers' new completely removable oven interior, which has rounded corners; this interior, fig. 3, may be taken out and cleaned apart from the cooker. It can be supplied in the standard finish or mottled grey enamelled.

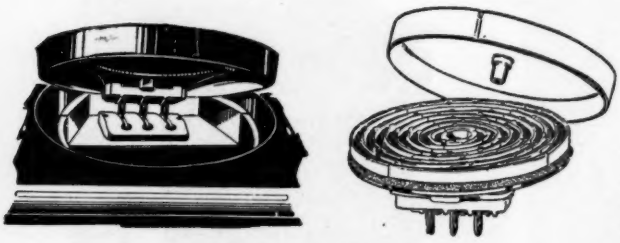


Fig. 5.—"Speediron" Boiling Plate.

In referring to the modern "Xcel" cooker, Siemens Electric Lamps & Supplies, Ltd., urge that the development of electric cooking could be still further speeded up, even under existing conditions of supply, by intelligent education of the consumer.

The modern electric cooker introduces true scientific principles in cookery, and by its close regulation of heat enables these principles to be applied with reasonable exactitude, ensuring not only maximum efficiency in the method, but perfectly cooked food, retaining all its natural and most nutritious qualities. Intelligent observation of the clock and thermometer will soon render the novice expert in the successful manipulation of an electric cooker.

Messrs. Siemens suggest that it is unfortunate that the term "boiling plate" should have crept into the nomenclature of electric cookery. The real virtue of the "boiling plate" consists in its heat-retaining qualities which enable prolonged culinary operations, simmering, and so on, to be continued at low heat, and finally completed some considerable time after the current has been switched off. With regard to the "Xcel" electric oven, careful and prolonged tests, it is claimed, have proved that, provided time allows, and current is switched on some time before the cooker is required for use, more economical results can be obtained on "medium" or even "low" heats than by the usual methods of boosting up on "high" and subsequently switching down to "medium" or "low."

It is pointed out that from the standpoint of the manufacturer it is perhaps unfortunate that various supply authorities should have formulated divergent views as to the most correct specification for electric cookers for use in their respective areas. This diversity of opinion, although doubtless inevitable in the evolutionary stage from which the trade is now happily emerging, is showing a gratifying tendency to culminate in comparatively few approved models, which, in the interests of mass production and consequent cheapness, it is hoped will meet most requirements. In this connection "Xcel" cookers have been designed to conform to the specifications of several of the most important supply authorities in both London and the provinces, and although there are minor differences between the various

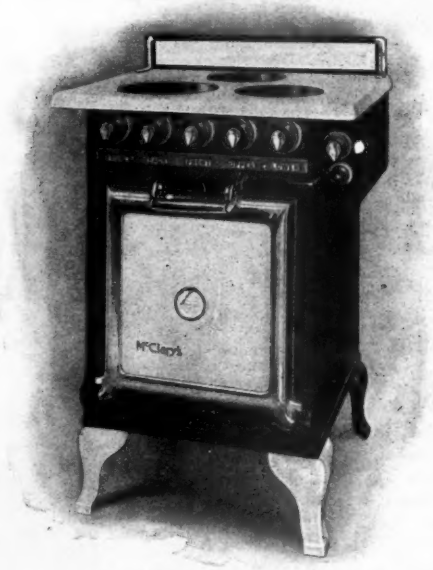


Fig. 6.—McClary Cooker, No. 6.

models conforming to the desires of individual supply engineers, the underlying principle of standard elements, boiling plates, and so on, has been retained throughout without sacrifice of efficiency; there are "Xcel" cookers to suit all tastes, as well as limited kitchen space. While the present tendency is towards standardisation of the oven and hob, finality has not yet been reached with the boiling plate.

The "Xcel" plates take the form of a resistor element embedded in a special refractory substance contained in a circular cast housing. The standard boiling plates have diameters of 5¼ in., 7 in., and 8¾ in. respectively, and are loaded for varying requirements up to a maximum of 44 W per sq. in. Under test, "Xcel" boiling plates compare very favourably indeed, it is claimed, with other leading makes, both in efficiency under load and in heat-retaining qualities. They have a proved efficiency averaging 54 per cent. in boiling 4 pints of water from cold in a commercial aluminium utensil, not specially surfaced. Due to improved insulators and the helpful co-operation

of the manufacturers of refractories, the cookers of this make are claimed to be immune from short-circuiting.

Fig. 4 shows model H.1040, which embodies all the possible refinements, *viz.*, hot-cupboard, splash plate and thermometer, with enamelled oven side linings and inside door lining, and a white enamelled crown-plate; the external finish is bright stoved black enamel. The oven cooking space is 15 in. high by 16 in. square, and the hobplate is equipped with two 7-in. "Xcel" boiling plates, and a 10-in. by 8-in. grill.

Fig. 7.—The "Elect" Hot Cupboard.

The most recent development of Messrs. Berry's Electric, Ltd., is the production in this country of the McClary cooker. A feature of this apparatus is the "Speediron" element, fig. 5, a new protected boiling-plate element designed to give a spill-proof, damage-proof cooking top to the electric range. It is capable of rapid heating, gives an intense concentrated heat when in operation, has a heat-retaining surface, and embodies the plug-in feature.

The under part of the element is equipped with prongs which fit exactly into the grooves of the plug beneath the cooking surface. By levering the unit upwards, fig. 5, it is freed from the range with the least possible trouble. The element proper is protected and safe-guarded by a firm, smooth damage-proof surface. The interior can be easily removed for repair.

The oven is surrounded with a generous thickness of heat insulation which, it is claimed, gives all the virtues of a thermos bottle. A one-inch air space

Fig. 8.—"Universal" Cabinet Cooker.

is also provided. These features combine with the steel body to maintain the temperature within the oven. Experience has shown that after roasting or baking has been carried on for some time, other foods can be cooked with the current turned to "low" or "off." The oven interior has a smooth porcelain enamelled glassy-like surface, which, with the rounded corners, greatly facilitates cleaning. The oven elements are of the pull-out type, and the wire is carried in porcelain housed in a solid cast-iron base. A heavy wire guard protects the heating wire from accidental contact. The design is so arranged that the whole construction is held together by two bolts only.

The oven element connection is a patented exclusive feature of McClary's electric range. It makes possible the removal of the oven elements so that the oven may be easily wiped out over the entire surface. The connection is air-cooled by reason of a half-inch space at the ends of the outside pressure springs. Fig. 6 depicts style No. 6 of the McClary ranges. It is fitted with white enamelled door panel in a nickeled frame. The cooking top is of cast-iron in one piece, and is grey enamelled. The total loading varies from about 5,400 W to 7,000 W, according to the style. The overall dimensions are 34 in. high by 25 in. by 22 in.

Some features of the electric cookers manufactured by the Electric Heating Co. will be of interest to our readers. In all the "Elect" cookers now on the market, open-type boiling plates of the original and fully protected pattern with ample means for drainage are fitted. A grill of maximum dimensions is also attached, while the ovens are complete with rotary switches and damper-type fuses of H.O. pattern. They offer a compact formation, and the finish of the whole is of a high standard. The hob, being hinged at the back, can be lifted and fixed in the vertical position, thus giving easy access to the boiling plates and grill, which are of the plug-in removable type. The interiors of all "Elect" ovens are welded at the joints. The lay-out of the elements gives side and bottom heat only, with, it is claimed, a perfect circulation of heat to all parts of the oven.

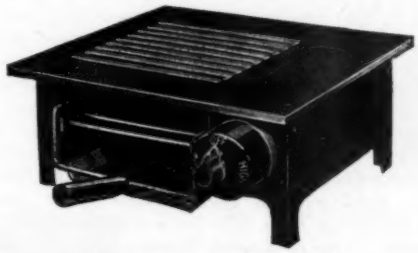


Fig. 9.—An "Arora" Boiler-griller.

Fig. 7 shows an "Elect" electric hot cupboard. It is strongly constructed of planished steel and angle iron, and can be made in various sizes to suit any requirements. The heating arrangements are controlled by a 3-heat switch. All the frame work is bright iron, the legs being of strong cast-iron. The dimensions are 3 ft. 4 in. by 2 ft. 10 in. wide by 1 ft. 9 in. deep.

Some recent improvements in the "Universal" electric ranges of Messrs. L. G. Hawkins & Co., Ltd., are worthy of note. An interesting development is that the oven door hinges are fitted with springs, which, together with the deep bevelled edges on the inside of the door itself and the inner face of the oven, give the user, it is claimed, increased efficiency in the matter of the oven's heat-retaining properties. This is a very simple device, but most effective, and permits of the heat being retained in the oven after the current has been switched off for a very much greater period than before. Another point of interest is the new rustless oven linings which are now being fitted to the larger "Universal" ranges, and will shortly be applied to the cheapest models. Another feature is the automatic oven control which is now being fitted to the larger cookers. By the simple setting of a knob the maximum temperature at which it is desired the oven should work is controlled by means of a mercury switch, so that should the user of the range not be present when the required degree of heat is reached, the current is automatically cut off until the temperature drops by 10 per cent., when this switch "cuts in" again.

The most recent introduction of Messrs. Hawkins is the combined kitchen cabinet and electric cooker shown in fig. 8. It is equipped with a slide directly under the range frame, which can be used as a mixing board or a temporary shelf. At the right of the cabinet are drawers that afford easy access to cooking ingredients, the bottom drawer being tin lined. Shutting the drawer automatically slides the tin cover over the bread box. Heat from the range does not reach the cabinet. The main part of the cabinet is fitted with two slides, so arranged as to pull out to the very end without tipping. The cabinet is of wood finished with white enamel.

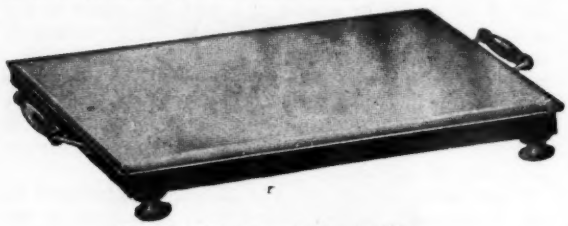


Fig. 10.—The "Serva" Warming Plate.

Support is given nowadays to the view that full advantage cannot possibly be taken of electric cooking unless it is carried out in conjunction with a separate water-heating system. In developing its electric cooking apparatus, the Bastian Meter Co., Ltd., has made a strong point of this, and it urges the fitting of a separate water heater in the kitchen to give a preheated water supply and so save the strain on the cooker's weakest part, the boiling plate. The company suggests that the principal trouble lies in the fact that people naturally try to heat all the water they want for cooking, washing, &c., on the boiling plate, whereas if a separate storage geyser were fitted, the plate could be left to deal efficiently with its real job, cooking in the true sense of the word, with the further advantage that the kettle filled from the storage geyser could be readily brought to the boil, so overcoming another complaint so often levied against the electric cooker.

Messrs. Bastian draw attention to the fact that in Wimbledon a 5-gallon geyser costs about 8d. a week to run, and it is suggested that the cooking bill for a kitchen fitted with a geyser under these conditions would be lighter than that for a similar kitchen minus the geyser. One of Messrs. Bastian's storage geysers is illustrated and described in the article in this issue on water heating.

It is interesting to note that the Arora Co. is of the opinion that had the engineers who drew up Report No. 82 of the Incorporated Municipal Electrical Association collaborated more carefully with some of their assistants who are dealing with the active side of electric cooking, they would not have expressed such a

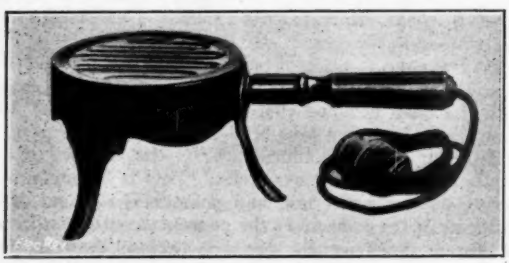


Fig. 11.—A small Boiling Ring, F.S.

strong opinion as to the advisability of totally enclosed boiling plates. The makers claim to be fully in sympathy with those who are advocating the maintenance of the large cross section for all element windings.

A recent addition to the products of the Arora Co. is the new complete little cooker shown in fig. 9. In this is included the latest 3-heat reversible handle switch of ample capacity and a new terminal block of porcelain insulation having two poles for the leads and a third terminal for earth-wire connection. The grid, although easily removable, is fixed in position with four screws, and every part is thoroughly earthed.

Two recent introductions of Messrs. H. W. Sullivan, Ltd., are the "Secura" boiling plate and the "Serva" warming plate, fig. 10. The former is equipped with "bridge" type elements of 750 or 1,500-W loadings, and a foot-press type of switch. The dimensions are 6¼ in. high by 11 in. wide by 11 in. deep. The finish is black enamel. The warming plate is equipped with two "Clip" type elements of a total loading of about 350 W. The overall dimensions are height 3 in., width 10½ in., and length 21 in., the weight being 6½ lb. The apparatus can be supplied with either polished-copper or nickel-plated finish.

Two recent productions of Messrs. Falk, Stadelmann & Co., Ltd., are a 600-W portable boiling ring, fig. 11, and one of 1,000-W loading. The one illustrated should prove particularly useful in the small flat when used in conjunction with the small type of electric oven. It weighs under 2 lb., and measures 5 in. in diameter and 4 in. high. The larger ring weighs nearly 4 lb., and is 8 in. in diameter by 5 in. high. It is equipped with a 3-heat switch.

The most recent development in connection with the cookers of Messrs. Credenda Conduits Co., Ltd., has been the production and provision of vitreous enamelled hobs and the adoption of the makers' enclosed boiling plates. Fig. 12 shows the general construction of these plates, which are made in two sections, with loadings

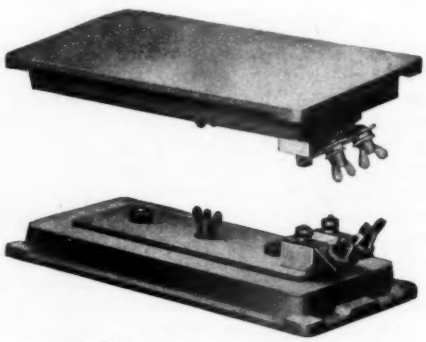


Fig. 12.—The "Creda" Boiling Plate.

of 500 or 900 W, so as to form a complete plate approximately 8 in. square. The 1,800-W loading is recommended when only one plate is fitted. Exceptionally long resistance spirals are employed at unusually low current density; these are laid in china formers, and the whole is embedded in a non-hygroscopic cement, giving, it is claimed, a high efficiency, long life, and complete freedom from trouble in use. The plates attain a dull red heat in use, resulting in rapid heating. The insulation is very high, and the plates are flashed at 2,000 V before dispatch. An interesting "Creda" model is the C.43, which is designed to serve a family of from two to four persons. The oven is thoroughly lagged, and is fitted with a baking tin and two rod shelves. The elements are arranged at the sides and bottom. A large grilling and plate-warming compartment is provided, the grill pan measuring 11½ in. by 9 in. The white enamel crown plate is removable. The hob is of cast iron, dull nickel-plated and rustless, and contains one complete boiling plate, as described above, with a separate grill fitted beneath. Both the plate and grill are arranged for 3-heat control, as also is the oven. The oven interior is removable in one piece for cleaning. The loadings are: oven, 1,250 W; boiling plate, 1,800 W; and grill, 1,500 W.

It may be useful to recall to the minds of our readers the new totally enclosed boiling plate introduced this year by Metro-Vick Supplies, Ltd. This was described and illustrated in our issue of June 3rd, 1927, p. 904, in connection with our review of the electrical exhibits at the I.M.E.A. Convention at Buxton.

Domestic Electrical Water Heating.

New Developments and Improvements.

Of all the classes of domestic equipment, it is probable that water-heating apparatus has made the greatest progress in the last two or three years. This has been helped to a great extent by the special tariffs instituted by many electricity supply undertakings which have made feasible what was at one time an expensive application of electricity. In this short article we cannot hope to cover every advance which has been made in construction and method; we aim at indicating the direction which these have taken by a selection of typical examples of modern water-heating appliances. Generally speaking, there are two main classes of water heater, the slow continuous (or storage) pattern and the rapid heater for giving comparatively small quantities at a very high temperature. The former class comprises a tank of some kind, while the latter (including kettles and immersion heaters) has usually only a small containing chamber or none at all.

The Jackson Electric Stove Co., Ltd., makes several good examples of the storage water heater. A recent range (from 2½ to 30 gal. in seven sizes) consists of a lagged heavy-gauge tinned copper or galvanised iron water container with an outer shell. The tank is so designed that, if it is desired, it can be placed in series with an existng hot-water system, electric heating being used only in the summer when there are no fires. The immersion heater employed is designed to raise the temperature of the water to 190 deg. F., and is controlled by a thermostat. One of these boilers is illustrated in fig. 1.

Fig. 2 illustrates a novel form of "Heatrae" geyser which has recently been produced by Electric Fires, Ltd., Norwich. As will be seen, it consists of a rectangular switch box and a tubular heating compartment. The water valve and switching arrangement are interlocked, and very fine adjustment is provided to meet varying pressures of water supply. Before the current can be switched on, the water must commence to flow, and it cannot be stopped before the heater is switched off. The apparatus is easy to install, and the electrical circuit is entirely insulated from the water. The 8-kW size has a rate of flow varying from 9 to 2 pints per minute at a temperature ranging from 100 to 200 deg. F.

The latest model of "Storageyser" (Bastian Meter Co., Ltd.), is shown in use in fig. 3. The principle employed is that the water enters the tank at the same rate as it is heated, so that the level of water in store is continually changing, and the water remaining is not lowered in temperature. Thus when the tank is nearly empty, hot water can still be obtained. By this arrangement it is possible to utilise a 100 per cent. load factor

Fig. 1.—A "Jackson" Water-storage Heater.

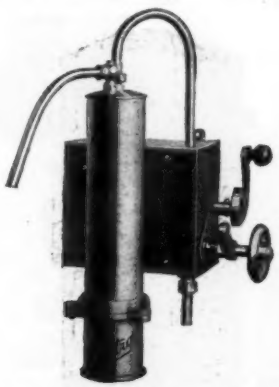


Fig. 2.—A New "Heatrae" Geyser.

Fig. 3.—The Bastian "Storageyser."

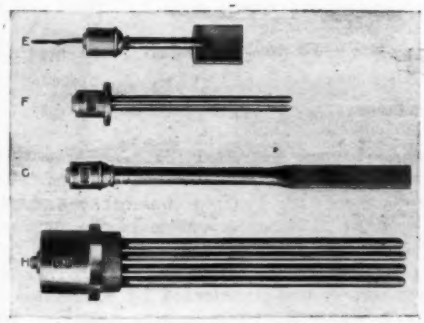


Fig. 4.—"Genii" Immersion Heaters.

Fig. 5.—A "Genii" Water Heater.

Fig. 6.—The "Inventum" Domestic Cistern.

with a low boost for occasional use. This is satisfactory to the supply authority and to the householder, who is protected against waste by servants.

An interesting selection of "Genii" immersion heaters (Messrs. George Nobbs, Ltd.) is shown in fig. 4. Several other patterns are made by the company, but these are typical. The first one (E) and the third (G) are suitable for all ordinary purposes, *e.g.*, for boiling water in a jug, but the other two would appear to be adapted for fixing into a tank, where they would be left. The company makes a wide variety of water-heating apparatus, in which these immersion elements are employed. The appliance illustrated in fig. 5 is a bath-water heater of the "push system" pattern, the water valve being fitted on the cold water side of the heater so that the latter cannot be subjected to the pressure of the water mains. In the water tank is a central pipe open at the top; cold water enters at the base and pushes upwards the water already heated, which flows into the central pipe, and is drawn off at the outlet nozzle at the bottom of the pipe. The heater is supplied with tanks of four capacities and various loadings.

Among the "Inventum" water-heating apparatus (Alan G. Wright) is the "Domestic" cistern depicted in fig. 6. This is one of a series in which an inner water container is surrounded by an outer shell, the intermediate space being lagged with shredded cork. The "push" principle is embodied in the appliance. Upon entering, the cold water strikes a baffle plate, and is forced through limited inlets into the bottom of the main tank so that it does not mix rapidly with the hot water. The influx of cold water forces the water already heated to the top, whence it falls through an outlet pipe to the draw-off nozzle. By means of a water-levelling chamber the outflow of hot water is cut off immediately the supply cock is turned off.

A very useful domestic water heater is the "Cumulus" pattern, supplied by Messrs. Nathan and Allen, Ltd. It is made in three models: the wash-basin type (fig. 7), the bath type, and the floor type. The heater consists of a galvanised-steel tank, which is surrounded by a sheet-iron shell, the space being efficiently lagged. A specially constructed heating unit, contained in an iron tube, is fitted into the inner tank, and is controlled by an automatic temperature switch which is arranged to switch on and off at about 174 and 194 deg. F. respectively. This prevents the boiling of the water with the subsequent development of steam pressure. The heated water, as in the two foregoing examples is forced upwards by the incoming cold water supply, falling down an interior tube to the outlet. The capacities of these heaters range from 4.5 to 33 gal., with appropriate loadings.

Another hand-basin water heater is that made by the Hotpoint Electric Appliance Co., Ltd., and illustrated in fig. 8. In this case the copper tank (tinned inside and white enamelled outside) is unlagged, and the "push" principle is again employed, there being an internal siphon arrangement to prevent dripping. A standard "Hotpoint" 2-kW immersion heater is fitted, and this is wired for control by a three-heat reciprocating switch, mounted at the base in front of the cylinder. It has a hot-water swivel outlet, and 3 ft. of rubber hose is provided for connection to a water tap. The heater is fixed over the basin by means of two brackets, which are riveted to the cylinder. It is arranged to give a full supply of water at a suitable washing temperature in 10 min., or boiling water in about 45 min. Fig. 9 depicts one of the company's standard immersion heaters for ordinary domestic use.

A new type of storage heater has been put on the market by the Sun Electrical Co., Ltd. This appliance, which is shown in fig. 10, is of the low-consumption continuous type controlled by a thermostatic switch. The interior is divided into two parts—a primary and a secondary heating chamber, which are unconnected except by a small orifice in the primary cone. Only the water in the primary heater is in direct contact with the elements. Heat is generated in the primary chamber, and is transferred by conduction to the bulk of the water in the secondary heater. The thermostat operates with the narrow range of 5 deg. F. Incoming water is distributed by a baffle plate, which extends for about a third of the circumference of the cylinder. The tank is made in sizes from 2 to 20-gal. capacity.

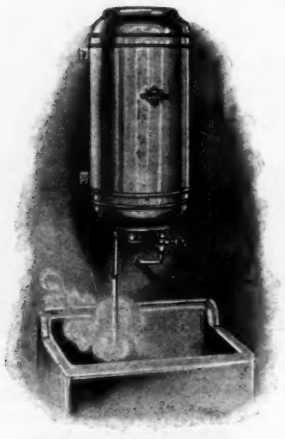


Fig. 7.—The "Cumulus" Wash-basin Water Heater.

Fig. 8.—A "Hotpoint" Hand-basin Water Heater.

Fig. 9.—A "Hotpoint" Domestic Immersion Heater.

Fig. 10.—The "Sunco" Storage Heater.

We have not dealt with either kettles or hot-water radiators in this article, for both classes are of a separate nature. Generally speaking, kettles are much alike, although there are two main classes—one in which the element is fitted in the base and the other which employs an immersion heater. Another distinguishing feature of some kettles is the provision of a safety device to cut off the current in the event of the water boiling away. Hot-water radiators are only water-heaters in an incidental manner: water heating is not their main function.

Electric Lighting Fittings.

Decoration and Utility.

LIGHTING was the original application of electricity in the home, and it still holds first place. Not only is it invariably the means of introducing electricity to the public: it is all too frequently the only direction in which electricity is employed. In the earliest days the electric light was just a lamp with or without an inadequate shade or reflector. Then, when its artistic possibilities were realised, more ornate fittings were designed, sometimes without regard to the effect upon illumination. The aim of modern electric lighting fitting manufacturers is to provide adequate illumination combined with tasteful design. There is tremendous scope for better lighting fittings; too many householders accept without question the ugliest arrangements because they reduce the cost of installation to some extent. They need educating into discontent with such fittings by having more artistic and sensible designs brought to their notice. With this in view we offer a few suggestions culled from the publications of some of the leading manufacturers.

Glassware is probably the most important class of material in the sphere of electric lighting, and there are many companies specialising in this. A most comprehensive catalogue is published by Messrs. Hailwood & Ackroyd, Ltd. (formerly Ackroyd & Best, Ltd.), which illustrates hundreds of "Hailglass" bowls, shades, and globes in all shapes, designs, and colours. With such a variety it is impossible to select examples typical of the whole. Figs. 1 to 4 merely illustrate three shades and a bowl of the company's manufacture.

Figs. 1 to 4.—"Hailglass" Lighting Fittings.

Fig. 5.—Parchment-Shade Table Lamp.

Hundreds of beautiful designs of fittings are supplied by Messrs. Richson & Co. (1925), Ltd., crystal glass being a speciality of the company. This is employed in the construction of the most elaborate chandeliers and for simple single fittings. One of the latter is shown in fig. 5. This is a one-light pendant with oxidised silver ornament and cut crystal top and drops. Art glass ornamental fittings form another notable class in the company's range. These are produced in many exquisite colours to which black-and-white print cannot do justice. Fig. 5 shows an example of table lamp with a lacquered stand and parchment shade.

Fig. 8.—A "Siemens" Decorative Fitting.

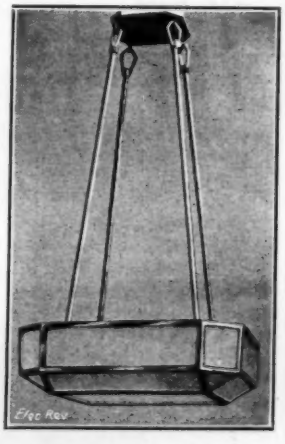


Fig. 9.—A "Firelite" Glassware Fitting.

Utility is the principal attribute of the lighting units produced by Siemens Electric Lamps & Supplies, Ltd., although appearance is certainly not neglected. Fig. 10 shows a typical kitchen or bathroom unit supplied by the company. This is a hygienic totally-enclosed fitting comprising a white-enamelled or metal-finished canopy holding a "Silvaray" glassware bowl. More decorative is the pendant bowl fitting depicted in fig. 8. This consists of a glass totally-enclosed bowl embellished with a design in subdued colours, held by a metal canopy of chaste design, and suspended by an ornamental chain.

Fig. 6.—A Crystal Pendant.

Fig. 7.—A Flint-etched Shade.

A glass fitting of a very unusual type is that depicted in fig. 9. This, a product of Messrs. Best & Lloyd, Ltd., is a brass-finished framework, supported by four square rods, with opal top glass, and obscured decorated side panels and bottom glass. It is intended for four lamps, and has a length of 3 ft. The "bowl" is 20 in. square. The glass used is the company's "Firelite," which is a very delicate orange to pale yellow.

Fig. 10.—A "Siemens" Kitchen Unit.

Fig. 11.—The "Salem" Fitting.

Fig. 12.—A Wooden Bracket.

Fig. 13.—A "Sunco" Bowl Fitting.

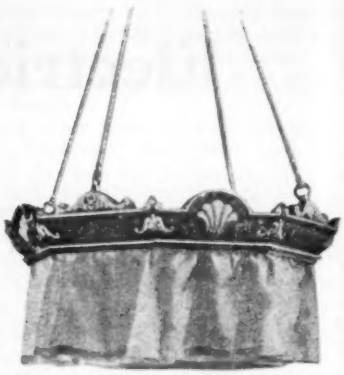


Fig. 14.—A Wood Shade Fitting.

Fig. 16.—A Hexagonal Shade Fitting.

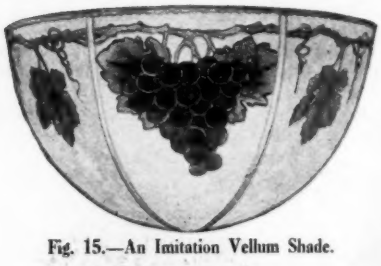


Fig. 15.—An Imitation Vellum Shade.

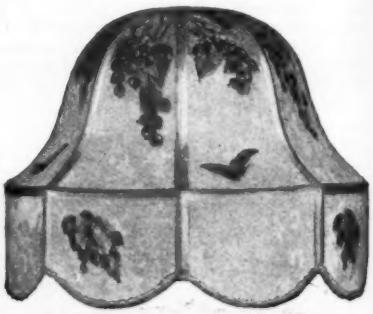


Fig. 17.—A Selz Silk Shade.

Fig. 18.—The "Pearlite" Sphere.

Fig. 19.—A G.E.C. Two-light Bracket

Fig. 20.—A "Silk-Ray" Shade.

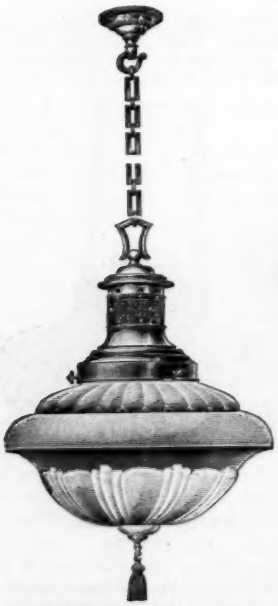


Fig. 21.—A "Supastone" Fitting.

Fig. 22.—A G.E.C. Table Standard.

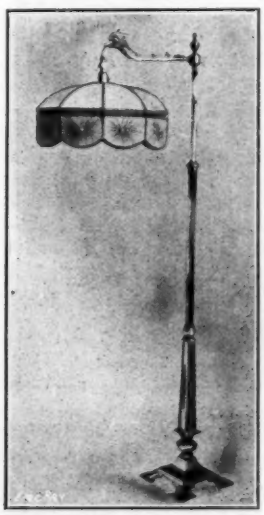


Fig. 23.—A Piano and Bridge Lamp.

Fig. 24.—A "Sunco" Flambeau.

The "Silverstone" glassware fittings produced by METRO-VICK SUPPLIES, LTD., present an almost bewildering variety, and the two examples chosen must not be taken as typical. Fig. 11 shows the "Salem" fitting, which is notable for the handsome chain with which it is equipped. The bowl is made in four sizes (from 12 to 18 in. diameter), and the metal-work has a natural bronze finish. One of the company's many ordinary decorative shades is illustrated in fig. 7. This is a flint-etched design 3¾ in. largest diameter and 4¾ in. deep.

The handsome floor standard shown in fig. 23 is made by MESSRS. FALK, STADELMANN & CO., LTD. This, again, must not be considered as representative of the very large selection of lighting fittings which the company displays at its new showrooms. It is described as a "piano and bridge lamp," which indicates the facility with which it can be put exactly where it is required. The standard itself is beautifully produced in oxidised silver, and the shade is of very tasteful design and colouring.

Wooden fittings are very appropriate in Tudor or Jacobean furnishing and demonstration schemes—and, of course, in many other instances. We therefore illustrate two or three examples of such fittings. WOODFYT SALES, LTD., issues a catalogue setting forth many classes and designs of fittings in mahogany, oak and walnut. One form of shade fitting is that illustrated in fig. 14. This is of walnut with a nicely-carved design, and is suspended by old gold cords. Fig. 12 depicts a bracket with two candle lamps for local illumination. This is produced in walnut with gilded ornamentation.

Another company which makes this kind of fitting is the GREGSON MANUFACTURING CO., LTD. The example chosen from the company's list is a shade fitting (fig. 16) of oak or mahogany finish. It is hexagonal in shape and is suspended by cords over which are threaded decorative wooden bobbins. It is provided with a wood ceiling plate.

Reverting to glassware, fig. 21 illustrates one of the "Supastone" fittings sold by the WHOLESALE FITTINGS CO., LTD. This is a dust-proof unit in three-ply glass with ornamental metal work, including a square-linked chain. Three sizes of bowl are supplied.

Fig. 20 shows a shade of unusual design typical of a class produced by LIGHTING TRADES, LTD. (incorporating J. & W. B. SMITH, LTD.). It is produced in any of seven colours, its base diameter is 8 in., and it is 5½ in. deep. Another fitting by the same company is the "Pearlite" opal sphere illustrated in fig. 18.

MR. CHARLES SELZ specialises in silk and imitation vellum shades, and examples of these two classes are illustrated in figs. 15 and 17 respectively.

A catalogue recently issued by the SUN ELECTRICAL CO., LTD., covers a very wide range of lighting fittings of all types and prices, and from it we have selected a bowl fitting shown in fig. 13 and a flambeau bracket (fig. 24). The bowl fitting is made in three diameters, the ornamented ring being produced in any one of four finishes; the bowl is of satin glass. The flambeau is available in three finishes, and the "flame" is of frosted glass.

As would be expected from a company of its eminence, the GENERAL ELECTRIC CO., LTD., provides everything in the way of lighting fittings. We illustrate two examples of the smaller varieties. Fig. 19 is a two-light bracket of simple design, and fig. 22 a handsome table standard in polished brass, or oxidised copper or silver, with an ornamental shade.

Selling Lines for Home and Export.

Electrical Products for the Trade Buyer.

IN most of the other editorial sections in this issue we have placed before our readers details of many new designs of electrical appliances and fittings that have been introduced by our manufacturers and traders for the busy season which has now commenced. In this particular "Selling Lines" Section we have brought together illustrated particulars of a great variety of products which are not claimed to be new or novel, but are appliances or goods for which their manufacturers or their agents are expecting, or are desirous of promoting, a steady sale. We are following, on this occasion, the course pursued by us early in the year in our series of "Electrical Retailer and Dealer" Supplements, as our experience has proved that the trade stands to do considerable business through editorial and advertisement attention being given to many articles which not only are not new but are actually in more or less common use. Unless manufacturers see to it that they are constantly brought before the trade, they are apt to be overlooked or to be forgotten. Some of them experience an increased demand according to the measure of publicity that they receive. We are reluctant to devote much of our space to information that is not new, but there are trade requirements which can be met in a "Selling Lines" Section of this kind once in a way.

The MORGAN CRUCIBLE CO., LTD., Church Road, Battersea, S.W.11, introduced two or three years ago a novel method of electric heating employing "low-temperature" elements fixed in a special material known as "Morganite." This is made into appliances for various purposes; for instance, fig. 1 shows a warming plate for domestic use, consisting of a "Morganite" panel fitted with lifting handles. A "Morganite" heating panel for fixing to a wall is illustrated in fig. 2. It is equipped with a metal pendant which gives it a downward slope. This appliance should find employment in such apartments as bathrooms.

Fig. 1.—A "Morganite" Warming Plate.

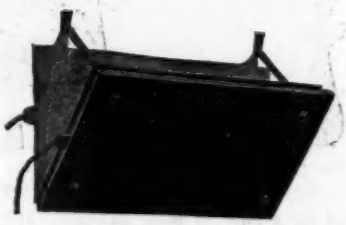


Fig. 2.—A "Morganite" Wall Heater.

A dual-purpose fire is shown in fig. 3. It is the "Model A" fire made by ENA ELECTRICAL APPLIANCES, LTD., and is fitted with scroll feet at six corners, which enables it to stand upright or to lay in a prone position with the elements upward. In the latter position, as shown in the illustration, a kettle can be placed upon the wire guard. There are two firebars, with a total loading of 750 W. Three finishes are available.

Fig. 3.—An "Ena" Dual-purpose Fire.

The towel airer shown in fig. 4 is made by Messrs. George Green & Co., 40, Aybrook Street, W.1. It is a very attractive appliance having a nickel-plate finish. As the loading is only 50 W, it costs no more than a lamp to run. Another product of the same firm is the "Gee Gee" hot-water radiator

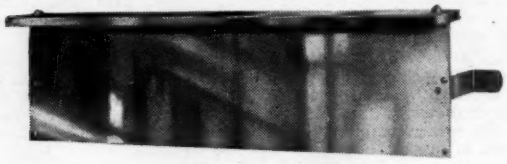


Fig. 4.—A Towel-Airer.

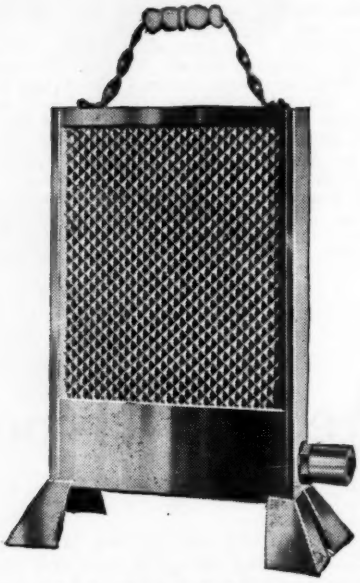


Fig. 5.—The "Gee-Gee" Radiator.

(fig. 5). This is constructed throughout of brass, and is provided with an immersion heater loaded with from 250 to 2,000 W. It is of light construction and reaches a good heat within 15 min. of being switched on.

Improvements in production methods have enabled the Croydon Engineering Co., Ltd., to reduce the price of its domestic suction cleaner, which is illustrated in fig. 12. It will be seen from the picture that the motor is mounted vertically. The nozzle is shaped so that it can be easily

Fig. 6.—The "Croydon" Suction Cleaner.

pushed under furniture; there is a stationary brush, the function of which is to push back the nap of a carpet to allow the suction to draw all dirt from the bottom of the pile. The machine runs on three rubber-tired castors. Starting and stopping is effected by means of a trigger switch fitted in the handle.

The Dowsing Radiant Heat Co., Ltd., Bollo Lane, Acton, W.3, manufactures a very comprehensive variety of electrical appliances, which includes electric irons of all kinds. One of these, a traveller's iron, is depicted in fig. 7. To meet the different voltages which are found in moving from place to place, this iron has terminals for two ranges—from 100 to 125 V and from 200 to 250 V. It weighs 3¼ lb. Another

Fig. 7.—A "Dowsing" Traveller's Iron.

Fig. 8.—A "Dowsing" Curling-tong Heater.

useful "Dowsing" appliance is the curling-tong heater shown in fig. 8. This is effective, although the loading is only 70 W, and it is automatically switched on and off by the insertion or removal of the tongs.

The "Electric Perfection" cooker illustrated in fig. 9, is the product of Messrs. Coley & Swinnerton, St. John's Square, Wolverhampton. This is an oven of light construction made in several patterns. The maximum loading is

Fig. 9.—The "Electric Perfection" Cooker.

1,000 W with one, two, or three boiling plates of 700 W each. The oven is well lagged and a glass panel is fitted in the door, a thermometer being arranged on one side. It can be supplied with short dome feet, as shown, or mounted on legs.

Among the special systems of lighting available are the following examples produced by the British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2. The "Eyerestolite" is an indirect and local lighting unit com-

Fig. 10.—The "Eyerestolite."

Fig. 11.—The "Luxor" Fitting.

bined, designed for a floor or table standard. It consists of an "X-Ray" reflector above and a diffusing bowl below, a gasfilled lamp being held between the two. The bulk of the light is reflected upwards to the ceiling, while a soft diffused light is given in a downward direction. Fig. 10 is a cut-away view of the fitting. Fig. 11 shows the "Luxor"

fitting (one of a series). This is somewhat similar in principle to the "Eyerestolite." An "X-Ray" reflector projects part of the light to the ceiling, and the rest of the light passes through the top of the glass on to the enamelled outer surface of the reflector, to impart a diffused illumination to the silk shade.

Fig. 12 depicts a very useful form of heater—the "Lawson," made by the BASTIAN METER CO., LTD., 58, Haymarket, S.W.1. This is of strong construction, having a cast-iron frame and

Fig. 12.—The "Lawson" Heater.

perforated steel jacket. It is fitted with one or two 1,000-W "Quartzalite" tubular elements. The flattened perforated top enables small vessels to be placed upon it. The heat is given out on both sides.

Among the "Universal" appliances sold by Messrs. L. G. HAWKINS & CO., LTD., 30-35, Drury Lane, W.C.2, is the washing machine illustrated in fig. 13. Messrs. Hawkins

Fig. 13.—The "Universal" Electric Washer.

state that there is an impression abroad that electric washers cannot be sold in this country, but they maintain that demonstrations in the prospective customer's own home work wonders. The "Universal" washer employs a rotating perforated metal cylinder, and is equipped with a conveniently operated wringer.

Another washing machine possessing many good points is the "Standard" (STANDARD TELEPHONES & CABLES, LTD.,

Fig. 14.—The "Standard" Electric Washer.

Bush House, Aldwych, W.C.2). Fig. 14 illustrates this appliance. It is of the reversing rotating cylinder type, and can deal with 10 lb. of clothes in fifteen minutes. The tank is of galvanised iron or internally-tinned copper, the mechanism is effectively shielded, and the wringer is fitted with a special tension release and a safety friction clutch.

The "Spersom" adjustable lamp depicted in fig. 15 is supplied by Messrs. CHAS. JOYNER & CO., Icknield Square, Birmingham. The base is of heavy cast brass and a strong rubber-covered spring is fitted which enables the lamp to be clipped

Fig. 15.—The "Spersom" Lamp.

on to furniture. The upper part, containing a switch and lampholder, can be moved through a wide angle, and the shade is arranged to remain in a horizontal position at any lamp angle.

A popular form of "breakfast" cooker is the "No. 61" pattern, made by the JACKSON ELECTRIC STOVE CO., LTD. (fig. 16). This is solidly constructed of cast iron, and comprises a self-contained grill, boiler and small oven. In the

Fig. 16.—A Jackson Breakfast Cooker.

last a joint of 3¼ lb. can be cooked while potatoes, greens, and a pudding can be boiled on the top. There are two 900-W elements controlled by a three-heat switch, and the appliance is equipped with a deflector plate, grill-pan, and grid.

The "Poliflor" electric floor polisher (C.C.A. (VACUUM CLEANERS), LTD., 324, Gray's Inn Road, W.C.1), illustrated in

Fig. 17.—The "Poliflor" Polisher.

fig. 17, has twin circular horizontal brushes rotating in opposite directions, and a border steadying brush. The brushes have a speed of 1,000 r.p.m., being driven by a 0.2-h.p. motor. It is possible to polish 2,250 sq. ft. of floor per hour with this machine.

Perhaps the outstanding feature of the "Siemens Xcel" iron (SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD.), 38-39, Upper Thames Street, E.C.4, illustrated in fig. 18, is that it carries

Fig. 18.—The "Siemens-Xcel" Iron.

a life guarantee; this indicates the makers' confidence in the appliance. The iron is made in six patterns from 3 to 8 lb. with loadings of from 300 to 600 W.

Messrs. GEORGE NOBBS, LTD., 89, Cleveland Street, Fitzroy Square, W.1, include a number of towel-airing rails among their products. The example is illustrated in fig. 19, is also a

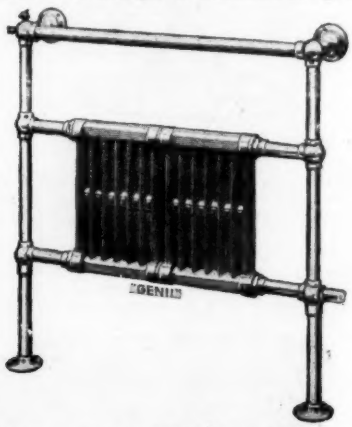


Fig. 19.—A Combined Towel Rail and Radiator.

hot-water radiator and should prove a useful fixture in the bathroom. The rails are of 1¼-in. solid-drawn brass tubing and the loading is only 500 W. The appliance is given a white hard enamel finish.

The "Electrolux" (ELECTROLUX, LTD., 153-55, Regent Street, W.1) vacuum cleaner is a handsome machine, as will be seen from the illustration (fig. 20). It is of the separate

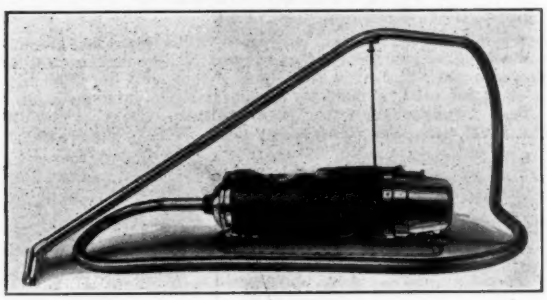


Fig. 20.—The "Electrolux" Cleaner.

container pattern, the body of the machine being mounted on runners for easy movement. Special precautions are taken to prevent dust getting into the motor or fan.

Electrical hairdressing appliances are a speciality of Messrs. I. CALVETE, LTD., 11, Little St. Andrew Street, Charing

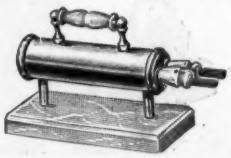


Fig. 21.—An Electric Curling-Iron Stove.

Cross Road, W.C.2. One useful little appliance made by them is the curling-iron stove shown in fig. 21. This is a nickel-plated appliance mounted on a marble base, the whole weighing 2¼ lb.

The "Goblin" suction cleaner made by the BRITISH VACUUM CLEANER & ENGINEERING CO., LTD., Parson's Green, S.W.6, and illustrated in fig. 22, is a very handy and inexpensive domestic servant. The equipment weighs only 7¼ lb., and

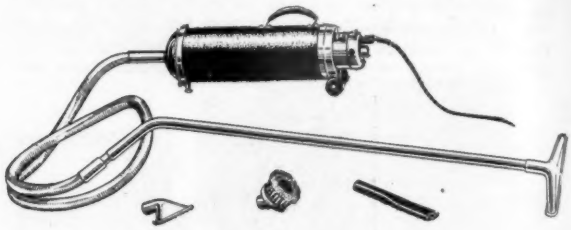


Fig. 22.—The "Goblin" Suction Cleaner.

requires only 160 W to operate it. The dust bag is completely enclosed, and a full equipment of accessories is provided.

The bowl fire shown in fig. 23 is made by MAGNUM ELECTRICAL APPLIANCES, Upper Elmers End Road, Beckenham. The bowl

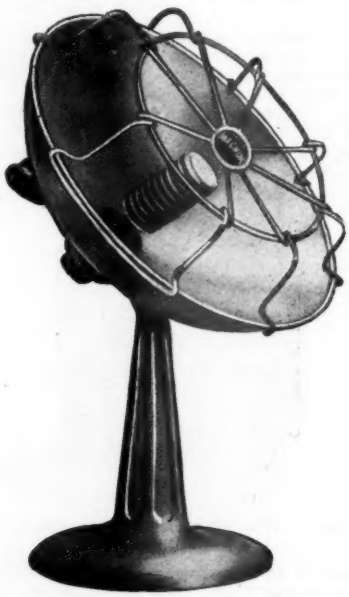


Fig. 23.—The "Magnum" Bowl Fire

can be locked in any position, and the wire guard is strong enough to bear a kettle. The coiled element has a 600-W loading, and the appliance is given a copper-bronze finish.

Another vacuum cleaner of the self-contained type is the "Eureka," depicted in fig. 24 (ELECTRIC APPLIANCES, LTD., 8,

Fig. 24.—The "Eureka" Vacuum Cleaner.

Fisher Street, W.C.1). The makers claim a high suction power for this machine and supply a set of very useful accessories for use with it.

A sewing machine motor which can be utilised for a number of other purposes is the "Hamilton Beach" home motor, depicted in fig. 25 (MESSRS. S. G. LEACH & CO., LTD., 26-30, Artillery Lane, E.1). It is mounted on a heavy base and needs

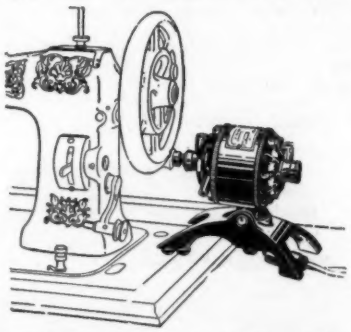


Fig. 25.—The "Hamilton Beach" Home Motor.

no fixing to the machine. A pedal control is supplied, by means of which the speed can be changed by varying foot pressure. Upon the shaft a small fan, grinding wheel, or other device can easily be fitted.

Fig. 26 illustrates the "Sunco" bowl fire (SUN ELECTRICAL CO., LTD., 118-120, Charing Cross Road, W.C.2). This has an

Fig. 26.—The "Sunco" Bowl Fire.

extra heavy gauge polished copper reflector, 12 in. in diameter, mounted on a toned bronze base giving an overall height of 13½ in. The element has a loading of 600 or 750 W.

Fig. 27 shows the "Savage" washing machine supplied by BERRY'S ELECTRIC, LTD., 86, Newman Street, W.1. This is a

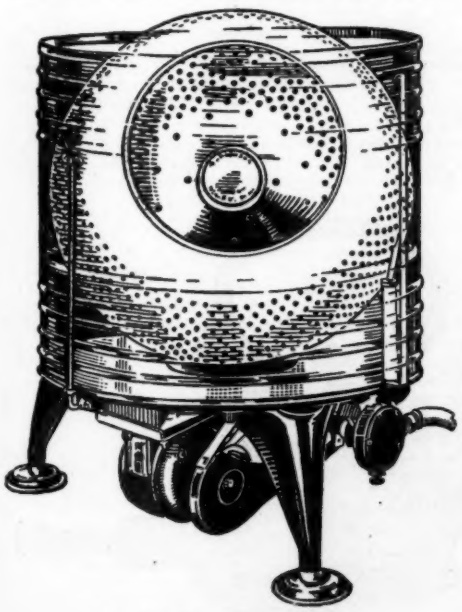


Fig. 27.—The "Savage" Washer.

wringerless washer. The clothes are spin-rinsed in a spray of fresh flowing steaming water and then, when the water is shut off, the water is spun out by the centrifugal arrangement seen in the illustration. The machine is fitted with an automatic pump ejector and a constant water level purifier.

The two examples of selling lines sent us by the CABLE ACCESSORIES CO., LTD., Tipton, Staffs., are of very different natures. The first (fig. 28) is the "Revo" garage hand-

Fig. 28.—The "Revo" Handlamp.

lamp, which has a long handle of insulating material, into the end of which the lampholder is well sunk, eliminating all risk of shock. The lamp is fitted with a substantial wire

Fig 29.—The "Lutean" Loud Speaker.

guard. Fig. 29 shows the company's "Lutean" cabinet loud-speaker with a polished Jacobean oak case, the dimensions of which are 14½ in. by 8 in. by 7¼ in.

Two useful little appliances for the home charging of radio or automobile batteries are made by Messrs. A. P. LUNDBERG AND SONS, 477-489, Liverpool Road, Holloway, N.7. The switch and charging plug connector (fig. 30) is for 5 A at 250 V. The

Fig. 30.—A Battery Charging Switch-plug.

Fig. 31.—A Battery Charging Adaptor.

plug is made so that it engages one way only, preventing reversal of polarity, and the spade terminals (which are provided with 6 ft. of flex) are marked. The other device is a lampholder adaptor (fig. 31), made of insulating material, arranged to put an accumulator in series with a lamp.

Messrs. Drake & Gorham Wholesale, Ltd., 67, Long Acre, W.C.2, are the suppliers of the "Busy Bee" vacuum cleaner shown in fig. 32. This is a lightweight machine of the self-contained pattern, the nozzle being equipped with a stationary detachable brush. Various cleaning accessories for special purposes are supplied.

Fig. 32.—The "Busy Bee" Cleaner.

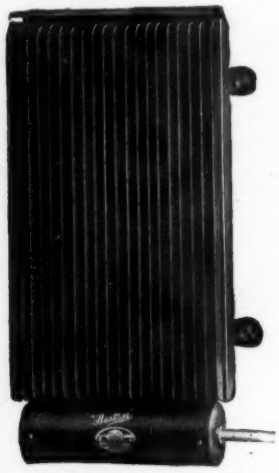


Fig. 33.—A "Heatrae" Air Warmer.

Fig. 33 illustrates one of the "low-temperature" heaters made by Electric Fires, Ltd., Norwich. It is of steel throughout; the large area provided by the fins dissipates the heat in a satisfactory manner, causing a rapid convection of air. The maximum projection from the wall is only 3¾ in. In spite of the appearance, the warmer contains no oil or water. This type is made in seven sizes, with loadings of from 500 to 3,000 W.

The "C.E.A.L." bowl heater shown in fig. 39 is a product of Coventry Electrical Appliances, Ltd., Fleet Street,

Fig. 34.—The "C.E.A.L." Bowl Fire.

Coventry. It has a coiled wire element, and is made in two sizes, 10 in. and 12 in. diameter.

A "Cosmos" towel airer (Metro-Vick Supplies, Ltd., Trafford Park, Manchester) is illustrated in fig. 35. This is a

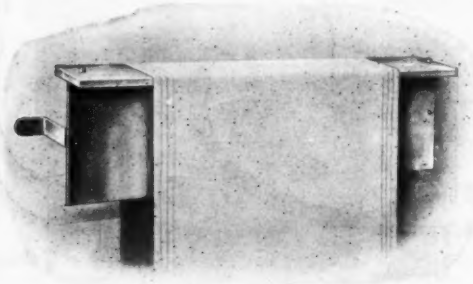


Fig. 35.—A "Cosmos" Towel Airer.

bathroom fitting, with a nickel-plated finish, consuming only 40 W—no more than a lamp.

A three-pin interlocking (or alternatively, non-interlocking) switch-plug has been introduced by the "M K" Electric, Ltd., Wakefield Street, Edmonton, N.18, and is illustrated herewith (fig. 36). The leading features of this device are as follows:—The switch mechanism is quick make-quick break, with a definite positive action. The sockets are of the patent "MK" spring-grip type, which is fitted with numerous flexible tongues that make firm contact with the plug pins, and they are of the 3-pin variety; provision is therefore made for earthing the apparatus connected to the plug, and safety to the user is provided by the interlocking device. The cover is of brown bakelite, mounted on a brown china base, making

Fig. 36.—The "MK" Switch-plug.

a neat combination. We are informed that this switch-plug has been adopted by a number of municipal authorities for housing schemes.

Fig. 37 illustrates an example of the refrigerators supplied by Kelvinator, Ltd. This is the "Sealtite" domestic pattern, which can be operated from a lampholder. A thermostatic

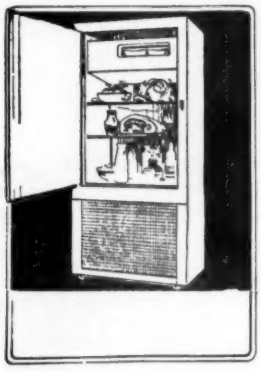


Fig. 37.—A "Kelvinator" Refrigerator.

control opens and closes a make-and-break switch as the temperature rises or falls. The refrigerator has a brine tank, which gives a 24-hour supply of "cold" if the electricity supply should fail.

From the products of the General Electric Co., Ltd., Magnet House, Kingsway, W.C.2, we have selected a kettle, not as typical of the immense range of the company's activities, but

Fig. 38.—A "Magnet" Kettle.

as an example of the good workmanship which characterises "G.E.C." appliances. The kettle (fig. 38) is mounted on three heat insulating feet and the handle is curved inwards to prevent the lid from falling off when the water is poured out.

The Overhead Lines Association.

A MEETING was held at the Institution of Electrical Engineers, London, on Wednesday, October 12th, to consider proposals to form an Association to deal with the problems connected with overhead transmission and distribution lines. Those present numbered over 60 persons.

Mr. R. BORLASE MATTHEWS, Wh.Ex., M.I.E.E., who took the chair, explained that the meeting was the result of a letter that he had written to the ELECTRICAL REVIEW. Its object was to form an organisation which would act as a *via media* between those who had charge of the erection and operation of overhead lines and the Central Electricity Board, the Electricity Commissioners, and those in authority, in order to render assistance to them and facilitate reasonable legislation regarding overhead-line work generally, so that economical and safe lines might be designed and sanctioned. It was the general consensus of opinion among those directly concerned that the regulations affecting overhead lines should not exceed in severity and unreasonableness the regulations affecting other public services, for instance, the Post Office telephone and telegraph lines, whilst there were also serious problems to be dealt with as regarded wayleaves. From the very considerable correspondence that had taken place since the first suggestion was made, the only criticism seemed to be whether another new Association should be formed, the argument being that there were already too many Associations. In general principle, he agreed, and although there had been no time to bring the matter formally before the Council of the Institution of Electrical Engineers, he had taken some steps to inquire into the matter as regarded the position of the Institution; it appeared that the organisation of the Institution was not so arranged at the moment as to carry out the work which it was felt a new Association could do. A large number of letters had been received in favour of the proposal, and a letter had also been received from Mr. Page, President of the Institution of Electrical Engineers, expressing himself sympathetically towards the objects in view, although doubting the necessity for forming a new Association. At the same time, Mr. Page had stated that he was not sure of the position of the Institution of Electrical Engineers in the matter.

Mr. W. C. BEXON, M.I.E.E. (Ayrshire Electricity Board) said that those concerned with distribution in rural districts by means of overhead lines were meeting with so many difficulties that it was obvious that something would have to be done if any real progress was to be made. Mr. Bexon then discussed the difficulties now being encountered, and severely criticised Form El.C.34, the filling-up of which meant that special experts had to be retained for the purpose. He also dealt with wayleaves and the powers possessed by the Post Office authorities, and suggested that some standard form of overhead-line construction for rural electrification should be decided upon among transmission line engineers and submitted to the Electricity Commissioners, so that extensions could be carried out without continually filling up forms. He emphasised the delays due to arbitration proceedings, the cost of which was often prohibitive, and concluded by proposing the formation of a committee of engineers.

Mr. W. FENNELL, M.I.E.E. (Mid-Cheshire Electricity Supply Co.) supported the general views of Mr. Bexon, and emphasised the point that electricity supply authorities were more harshly treated with regard to overhead lines than any other public utility authority; therefore it was essential for those concerned to get together and do something collectively if the development of rural electricity supply was to make the progress it should do. The experience of everybody concerned with overhead-line work should be pooled and made use of to the best advantage. There were already three committees in existence to deal with overhead lines, but more activity was required than that displayed hitherto; another Committee would be a mistake. Mr. Fennell concluded by moving that an "Overhead Lines Association" be formed.

Mr. F. SWARBRICK, A.M.I.E.E. (Basingstoke) seconded the motion, and mentioned the case of the Diesel Engine Users' Association as an example of what could be done by a small Association.

Major T. RICH, O.B.E., M.I.E.E., strongly supported the formation of a new Association, and contrasted the position as regarded the construction of overhead lines on the Continent and in America and here. On the Continent, he said, the Post Office lines were treated on an equality with those of electricity supply, and very often had to give way. He considered this was the psychological moment to go forward with the formation of an Association.

Mr. A. L. STANTON, M.I.E.E., as one who had had considerable experience with all forms of overhead transmission abroad and in this country, said that an Association was essential in order that the many difficulties arising could be discussed in an authoritative manner with those concerned with the administration of these matters.

Mr. R. C. ANDERSEN, M.C., A.M.I.E.E., suggested that the chairman and honorary secretary should send out a list of nominations of those who might serve on the first Council or Executive Committee.

The CHAIRMAN, before dealing with this point, put the resolution that an Association should be formed, and it was carried unanimously. After some discussion it was agreed unanimously that a Committee should be at once appointed to select the final Committee, and the preliminary Committee was elected as follows:—Messrs. W. Fennell, R. Borlase Matthews, A. H. Allen (ELECTRICAL REVIEW), W. A. Turnbull (Aylesbury), W. C. Bexon, C. W. Braithwaite (Wessex), and C. T. Allan (South Wales). It was agreed that all matters concerning conditions of membership, the election of a permanent council, the date of the next meeting, &c., should be left in the hands of this Committee.

The meeting closed with a cordial vote of thanks to the ELECTRICAL REVIEW for dealing with the preliminary work, and to the Institution of Electrical Engineers for affording facilities for the holding of the meeting.

At the request of the meeting, Mr. Theodore Stevens, M.Inst.C.E., M.I.E.E., of 50, Lincoln's Inn Fields, London, W.C.2, agreed to act as honorary secretary.

Later information will be found in our "Notes" to-day.

Legal.

Reliance Electrical and Maintenance Co. v. Waterhouse.

IN the Mayor's and City of London Court, before Mr. Registrar Dell, on October 11th, the Reliance Electrical and Maintenance Co. sued Mr. Waterhouse, a traveller, for a sum of £2 5s. 6d., balance of account for electrical work. Mr. GEO. COHEN, partner in the plaintiff firm, said they had had previous dealings with the defendant, who had been a customer of the firm for some time. They did electrical work for the defendant on January 14th, 16th, and 17th, 1926, when there was an amount of 19s. due. In February, 1926, an electric lamp was supplied, it being taken away by the defendant and his wife. The price was £1 3s., and on March 26th some repairs were carried out to electrical fittings which had been brought to the shop, at a cost of 3s. 6d., the total being the amount claimed. An account was sent seven days after the work was done, and a statement sent each month, but they had heard nothing from the defendant.

The defendant denied that he owed the money, and said that he knew nothing about the work which the plaintiffs alleged had been done.

The REGISTRAR said that both the plaintiffs' witness and the defendant seemed emphatic in their evidence. He would adjourn the case for the plaintiffs to obtain further evidence. The defendant said that rather than put the plaintiffs to further expense he would offer to pay the sum of £2 5s. 6d., without costs. The plaintiffs' representative would not accept the defendant's offer. The case was adjourned generally for the plaintiffs to restore it to the list when they were in a position to prove their case.

Receiving Charge.

ON October 14th, at Old Street, Thomas Kelly, of 17, Norton Folgate, again answered to six summonses for receiving wireless accessories, knowing them to have been obtained under circumstances which amounted to misdemeanour.

GEORGE PRATT, a salesman employed by the Ormond Engineering Co., said he remembered a man coming to the firm on February 1st and giving him a card on which was printed "F. T. Williams," stated to be a wireless agent. He ordered goods from witness to the value of £30 8s., and gave a cheque for the amount. He received references from Williams, but Kelly's name was not given. The cheque was returned by the bank marked "R.D."

CHARLES E. GERRETT, a salesman employed by the General Electric Co., Ltd., said that he received on April 22nd an order form headed "F. T. Williams, wireless agent, 111, Brixton Hill." It was an order for valves to the value of £33 11s. 3d. He recognised Williams as the man who presented the order. He gave a cheque, and the goods were taken away.

CECIL R. DANDO, assistant accountant to the General Electric Co., Ltd., said that the cheque was returned marked "R.D." On April 23rd witness received another cheque, for £14 7s. 8d., from F. Williams. It was also returned by the bank.

Miss WINIFRED ASHTON, employed by the Electron Company, Ltd., stated that she identified Williams as a man who came to the office on February 3rd and ordered 30 valves. He gave a cheque for £18 6s. 4d.

A. H. KAYE, sales manager to the Electron Company, said that in February he rang up the Norton Electric Co. to ask for a man whose name had been given as reference for Williams. That was in respect of a dishonoured cheque.

The hearing of the case was further adjourned.

A Miniature Motor.

A tiny electric motor, "so small that its rotor could be wrapped in a postage stamp," is used by the American Westinghouse Electric and Mfg. Co. for timing its "OB" watt-hour-meter demand register. It is probably the smallest synchronous motor ever made for practical use. The rotor could easily be worn, set in a ring, on a man's little finger.

Business and Industrial Notes.

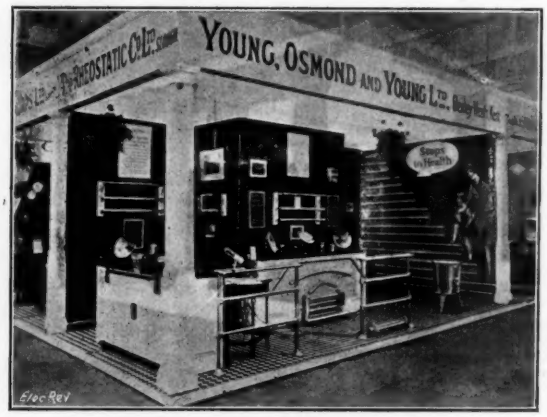
The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.

Catalogues Required for Nairobi.

The *Board of Trade Journal* says that the British Trade Commissioner in East Africa, Col. W. H. Franklin, C.B.E., D.S.O., is desirous of receiving catalogues and price lists from United Kingdom firms engaged in the manufacture of agricultural and other machinery, engineering lines—including electrical—hardware, pottery, and glassware. Catalogues may be sent direct to the Trade Commissioner, P.O. Box 220, Nairobi, Kenya, but the Department of Overseas Trade, 35, Old Queen Street, S.W.1, will supply further information as to what is required if necessary. Reference 19928/1927 should be quoted.

An Electrical Stand at Glasgow.

At the recent Housing and Health Exhibition at Kelvin Hall, Glasgow, the Rheostatic Co., Ltd., and Messrs. Young, Osmond & Young, Ltd., occupied a stand jointly. The principal feature of the display was the "Unity" tubular heating system, several arrangements of which were shown, as will be seen from the accompanying illustration.



An Electrical Stand at Glasgow.

The E.D.A. Circle Campaign.

The Shropshire, Worcestershire and Staffordshire Electric Power Company has now made a very earnest start in the E.D.A. Campaign. It has formed a circle covering the whole of its area; this will be known as the S.W. & S. Area Circle. The first meeting, with a large attendance, was held at the Stourport power house on October 10th, the chair being taken by Mr. J. T. H. Legge, the chief engineer and manager of the company, who gave a brief outline of the campaign, following which further details were given by Mr. Hamar. A very successful meeting was followed by tea, after which the power house was opened for inspection. Mr. Hamar, of the S.W. & S. Power Co., has been elected hon. secretary of the Circle.

The second number of "The Cedac Bulletin" reports the attendance at the national luncheons held on October 3rd, and gives the names of the chairmen and principal speakers. Other items are a list of exhibitions and demonstration houses and the numes of newspapers in which campaign advertisements are appearing during a fortnight. A separate schedule of publications, giving days of insertion, has been issued by the Association.

A local Circle is being formed on Teesside, and electricity supply authorities in the district are being asked to nominate representatives. The borough electrical engineer (Mr. R. H. Scotson) has been appointed to represent the Middlesbrough Corporation.

The Walsall Electric Supply Committee has decided, subject to local manufacturers, wholesalers, and contractors contributing a like amount, to contribute up to £100 towards the expenses of the local part of the campaign.

American Activity in Europe.

Two or three months ago representatives of the International General Electric Company, New York, paid a visit to German manufacturing works, it being then stated that Herr Deutsch, of the A.E.G., would subsequently pay a return visit to the United States. This visit is now in progress, and is said to be connected with negotiations between the German company and the General Electric Company concerning the financial participation of the latter in the establishment of electricity works in Poland, the border States and Russia. In this connection it is stated that the American company recently announced that it proposed in the future to devote greater attention to the question of foreign electricity works. Another matter is the report that the Aluminium Company of America has obtained an exclusive concession for the establishment of an aluminium industry in Russia, the period being 30 to 50 years, according to the amount of the capital invested. The company has to inform the Soviet Government by next month where it proposes to erect hydro-electric works for the purpose of dealing with the bauxite, the working of which the Russians have long held in prospect. In the third place, American capital is being extended in Italy. Apart from previous participations in the past two or three years, it is now reported from Rome that an American holding company for Italian electricity concerns is in course of formation with an initial capital of $35,000,000. It is assumed that the matter concerns power stations and distributing undertakings, in which increased interest has recently been manifested by American financiers.

Unemployment.

There was an increase of 25,780 in the number of unemployed during the week ended October 3rd. The total at that date was 1,075,900, as compared with 1,050,120 on September 26th, and with 1,572,700 on October 4th, 1926 (coal dispute period).

Callender's Band Successes.

The band of Callender's Cable & Construction Co., Ltd., which is familiar to broadcast listeners, has been successful recently in securing second place in the two principal band contests of the country. The first was the Senior Championship at Bellevue, Manchester, on September 5th, and the other the Championship of Great Britain at the National Band Festival, Crystal Palace, on September 24th. The band, with some of the trophies which it has secured, is seen in the accompanying picture.

Callender's Band.

Variants of Spanish.

In view of the often-expressed need for the use of Spanish in catalogues intended for the Spanish-speaking countries of South America, a recent article by Mr. L. Matters in the *Review of South and Central America* is of interest. The author says that each country—Argentina, Chile, and Uruguay, for example—has its own idioms which would perhaps be unrecognised in the other countries. For this reason Mr. Matters advocates the use of pure Castilian, which is the *lingua franca* of the nineteen Spanish-speaking countries, unless it is possible to produce separate catalogues for each.

Commercial Electrical Travellers.

The Electrical Trades Commercial Travellers' Association held their first social evening of the season on October 15th at the National Hotel, Upper Bedford Place, W.C.1. The event took the form of a Bohemian concert, and about 80 members and friends were gathered together under the genial chairman-

ship of Mr. A. S. Markes. The proceedings were delightfully informal, and all present evinced their satisfaction with the excellent programme by enthusiastically applauding every item. Mr. E. Boxall, siffleur, and Mr. L. Moir, members of the Association, showed that a commercial traveller's talents are not confined to pushing sales, and Mr. Moir's monologue was well received. During the evening a collection on behalf of the Association's benevolent fund realised £2. Mr. Markes announced that the programme for the season included a whist drive on December 3rd, and a carnival dance on March 24th, both to be held at the National Hotel. The items on the programme were well rendered by Miss Janet Miles (contralto), Miss Kathleen Severn (comedienne), Miss Marcia Bourne (entertainer at the piano and accompanist), Mr. Sidney Creasy (baritone), Mr. Charles Wren (humorist), and Charles Lewis (ventriloquist). The thanks of all present are due to Mr. Moir, Mr. Ward, Mr. Woolnough and others, on the entertainment committee for arranging a very pleasant evening.

The Scottish Lighting Service Bureau.

The Scottish Electric Lighting Service Bureau, Glasgow, during the present lighting season, besides its usual demonstration work, has in prospect many lectures on the theory and application of electric light, to numerous societies and commercial groups throughout Scotland. In Edinburgh alone, a series of six lectures will be given with the aid of specialists from the London Bureau. This comprises a complete Illumination Design Course, chiefly for those in the electrical industry. Master printers' associations in Edinburgh and Aberdeen, Rotary Clubs in Aberdeen, Inverness and Kirkcaldy, members of the Electrical Power Engineers' Association, the Drapers' Association, the Electrical Association for Women, the Philosophical Society and students from the Royal Technical College, Glasgow.—to mention only a few—have all arranged to have lectures dealing with some branch of illumination.

Our Foreign Electrical Trade.

The following were the values of imports and exports of goods and machinery during September:—

	Sept., 1927.	Inc. or dec.	Nine months, 1927.
Imports—	£	£	£
Electrical goods and apparatus ...	396,428	+ 61,088	+ 305,116
Machinery	1,309,012	+370,789	+2,392,731
Electrical machinery	128,573	+ 57,940	+ 355,038
Exports—			
Electrical goods and apparatus ...	1,004,383	−634,215	− 77,763
Machinery	4,290,956	+821,154	+1,950,155
Electrical machinery	580,240	+134,644	+ 887,446
Re-exports—			
Electrical goods and apparatus ...	11,836	− 2,511	− 27,088
Machinery	137,345	+ 15,165	+ 63,876
Electrical machinery	12,971	+ 6,614	+ 14,799

The decline in exports of electrical goods and apparatus, as compared with September, 1926, is solely due to a fall from £668,510 to £10,412 in the exports of submarine telegraph cables.

The State of the Engineering Industry.

In the course of a recent address, Mr. D. A. Bremner, director of the British Engineers' Association, said that the only sections of British engineering industry which had increased their export trade since 1913 were the electrical and automobile branches. The financial state of the engineering industry was illustrated by the decline in dividends. In 1924 the average of 66 representative companies was 4.6 per cent. on paid-up capital; in 1925 it was 4.3 per cent.; and in 1926 3.9 per cent. To pay the last dividend the companies distributed 42.2 per cent. more than they earned as profits; the balance was raised by drawing upon the reserves. The position was due to the fall in the world's purchasing power and to the high prices of our goods in comparison with those of our competitors. There was an urgent need for the elimination of "cut-throat" competition and for closer co-operation. Appeals to sentiment were useless; a sound economic programme was needed.

The British Industries Fair.

The British Industries Fair, 1928, has beaten all previous records, the total space let, over four months before the opening, exceeding the area of the previous largest Fair—that of 1921, which followed a boom period in trade. A thousand officers of the Commercial Diplomatic Service, Trade Commissioners and Consuls in all parts of the world, working under the direction of the Department of Overseas Trade, have enlisted the support of British Chambers of Commerce and British communities in their respective countries, and with the aid of British railway, shipping and tourist companies abroad it is hoped to attract a record number of buyers. In the list of 1,400 firms which have so far applied for space there are many important names.

Recent Contracts.

Messrs. Johnson & Phillips, Ltd., have supplied, through Messrs. Clarke, Chapman & Co., Ltd., all the electrical cables for the new Ellerman liner, *City of Canberra*, built by Messrs. William Gray & Co., Ltd., West Hartlepool. This is perhaps appropriate in view of the fact that Messrs. Johnson & Phillips have supplied to the Australian Government large quantities of cables for the new Government House at Canberra.

A third 12,500-kW "English Electric" turbo-alternator set has recently been installed at the Ribble power station of the Preston Corporation. This unit is driven by a two-cylinder turbine similar in general design to other machines of this type already built by the English Electric Co., Ltd. The impulse high-pressure turbine has a number of relatively small diameter stages and exhausts into the centre of a double-flow reaction turbine, which in turn is connected to twin condensers in the basement. The installation during the course of next year of a duplicate of the set mentioned above will bring the capacity of the station up to 50,000 kW.

An order for a steam turbine-driven turbo-blower has been received recently by the English Electric Co., Ltd., from Messrs. Newton Chambers, Ltd., Sheffield. The blower will be of the company's standard design, capable of delivering varying quantities of air, according to the requirements of the furnace, up to a maximum of 30,000 cubic feet per minute. It will be coupled to a 2,300-b.h.p. impulse turbine.

Extensions to the North Staffordshire Royal Infirmary were recently inaugurated by Prince Henry. Improvements have been made in the lighting of the buildings, and additional electrical work has been done. The electrical work in Ward "A" Block and the laundry was carried out by Messrs. Barnett and Soans, and that in the Nurses' Home extension by Mr. J. Baggulay.

Local Exhibitions.

Bermondsey.—An electrical exhibition, under the auspices of the Bermondsey Borough Council Electricity Department, was formally inaugurated by the Mayor on October 12th, and continued for a week, at the Central Baths. There was a large variety of well-displayed domestic appliances, the number of stands totalling 28. Electric cookers, heaters, irons, and other appliances, were shown by the Jackson Electric Stove Co., Credenda Conduits, Ltd., the Hotpoint Electric Appliance Co., Ltd., the General Electric Co., Ltd. (which also had two stands displaying wireless instruments), Wholesale Fittings, Ltd., and Metro-Vick Supplies, Ltd. Electric sewing machines were demonstrated by Singer's Sewing Machine Co. One stand was devoted to various types of measuring instruments, a number of well-known meter manufacturers being responsible for the display. Industrial exhibits included portable tools by B.E.N. Patents, Ltd.; a fault detecting bridge, armature tester, &c., by Price & Belsham; boot repairing machines operated by Messrs. W. Evenden, and loaned by Keats and Bexon; a model of a coal conveyor, electric hoist, &c., by the Transport Manufacturing Co., Ltd.; sausage making machines by J. Richards; coffee grinding machines by Herbert & Son; and electro-plating, oxy-coppering, &c., by the B.P. Plating Works. The E.I.M.A. exhibit included models showing good and bad workshop lighting, shop and shop-window lighting. A feature of the Public Health Department's stand was an exhibit of artificial sunlight treatment. The stands in the gallery were confined to exhibits of goods manufactured by electricity. Other exhibitors included the Enfield Cable Works, Ltd., Harper & Co., Lowenz & Wilkinson, and Haywood & Co. The favourable charges for electricity supply are reflected in the steady increase in the number of consumers, which averages 15 per week. The borough electrical engineer is Mr. W. E. J. Heenan.

Woking.—A Trades Exhibition was to be opened by Mr. A. M. Samuel (Parliamentary Secretary to the Department of Overseas Trade) on October 19th; it will remain open until October 26th. One of the principal exhibitors is the Woking Electric Supply Co., Ltd., which has a comprehensive display of domestic and other electrical appliances and is giving cooking and "Sun-Ray" demonstrations. Other stands of an electrical nature have been arranged by Messrs. Moore, Ltd., Weybridge, A. V. Pearce and H. Quartermaine.

Electric Power in Industry.

Continuing the review of the 1924 Census of Production, Preliminary Report No. 24 deals with a number of public utility services. It is shown that gas works had 24,253 kW of electric generating plant and 54,908 h.p. of electric motors, power for 17,167 h.p. being purchased. Waterworks undertakings reported 2,080 kW of generating plant and 24,205 h.p. of motors (power for 19,679 h.p. purchased). The electricity supply industry was dealt with at length in our last issue. In other work carried out by local authorities, 14,669 kW of generating plant was employed. The motors installed aggregated 48,735 h.p., power for 38,777 h.p. of which was purchased. Canals, docks, harbours, &c., reported only 640 kW of generating plant, and motors totalling 9,558 h.p. (power for 9,408 h.p. purchased). Tramway and light railway undertakings had only 4 kW of generating plant and 3,166 h.p. of motors. These figures relate only to repair and construction work and do not include power required for traction purposes or the equipment of tramway companies' power stations.

Preliminary Report No. 25 shows that the bread and biscuit trades employed 2,681 kW of generating plant and 66,103 h.p. of motors (power for 63,017 h.p. purchased). The figures for the manufactured stationery trades were:—Generating plant 1,266 kW; motors 9,416 h.p. (power purchased for 7,440 h.p.). The scientific instruments, appliances, and apparatus trades reported 2,017 kW of generators and 12,907 h.p. of motors (power purchased for 10,891 h.p.).

Trade Announcements.

The address of the Power Lines Construction Co., Ltd., has been altered to Dacre House (Dean Farrar Street), Victoria Street, London, S.W.1.

The Stechford works of the Electrical Power Engineering Co. (Birmingham), Ltd. (Mr. J. S. Plumtree), have moved into new premises at Ward End, Birmingham.

New Catalogues and Lists.

The Normand Electrical Co., Ltd., 3, North Side, Clapham Common, S.W.4.—A folder illustrating and describing "Neco" fractional h.p. motors; priced.

The British Resistor Co., Ltd., Clare Road, Halifax.—A folder dealing with the Whitehouse "Instant" system of water heating.

Messrs. Cunningham, 169-171, Edgware Road, W.2.—An illustrated folder advertising the firm's service and the appliances for which it is agent.

The English Electric Co., Ltd., Queen's House, Kingsway, W.C.2.—Publications No. 278a, containing a list of "English Electric" convertors supplied or on order; and No. 950, describing the electrification by the company of the iron and steel works of Messrs. Raine & Co., Ltd., Newcastle.

Metro-Vick Supplies, Ltd., Trafford Park, Manchester.—A series of instructional pamphlets dealing with the construction of receiving sets employing "Cosmos" components and valves, for battery or mains working.

Messrs. Ferranti, Ltd., Hollinwood, Lancs.—Leaflets Wa.411/1, 411/2, and 412, dealing respectively with chokes, fixed condensers, and push-pull transformers. Illustrated and priced.

The British Thomson-Houston Co., Ltd., Rugby.—Four illustrated and priced leaflets, advertising "Tungar" battery chargers for the home and garage.

The Jackson Electric Stove Co., Ltd., 143, Sloane Street, S.W.1.—A calendar-blotter advertising the company's lagged storage water heater.

The Hart Accumulator Co., Ltd., Stratford, E.15.—A mailing card bearing an inquiry form for dealers.

Messrs. Watson & Sons (Electro-Medical), Ltd., 43, Parker Street, Kingsway, W.C.2.—Bulletin No. 88, containing illustrated descriptive matter dealing with the company's apparatus for h.p. cable testing and fault location.

The Sunderland Forge & Engineering Co., Ltd., Pallion, Sunderland.—A booklet entitled "Forty Years of Progress," illustrating examples of work carried out by the company.

The Excelsior Shade Mfg. Co., 1, Julian Road, West Bridgford, Nottingham.—A priced folder illustrating several examples of the firm's silk-shade wood lighting fittings.

The Benjamin Electric, Ltd., Brantwood Works, Tottenham, N.17.—The "Benjamin Reflector" for October, containing illustrated notes on the company's industrial lighting fittings, &c.

Bankruptcy Proceedings.

A. Lawrie (Houchin & Lawrie), electrical engineer, 9, Melbourne Parade, Palmers Green.—First meeting held October 19th, at 29, Russell Square, W.C.; public examination, October 26th, at the Court House, Upper Edmonton.

E. Pritchard, electrician, 5, Weavers Buildings, Dudley Road, Wolverhampton.—First meeting held October 20th, at the Official Receiver's office, 30, Lichfield Street, Wolverhampton. Public examination, November 16th, at the County Court, Wolverhampton.

M. Newton (M. Newton & Co.), incandescent and electric lighting fittings merchant, 3, Oakwood Avenue, Roundhay Road, Leeds.—Receiving order made October 12th on debtor's own petition.

W. R. White and C. W. Brown (Whitbro Engineering Co.), electrical engineers, Hurstmonceux Electricity Works, Hurstmonceux.—First meeting, October 21st, at the Official Receiver's offices, 12a, Marlborough Place, Brighton; public examination, November 1st, at the Town Hall, Eastbourne.

L. Mathias, electrical contractor, 469, Oldham Road, Failsworth, Lancaster.—First meeting, October 24th, at the Official Receiver's offices, Byrom Street, Manchester. Public examination November 9th, at the Court House, Oldham.

P. W. Horne (Horne Bros.), electrical engineers, 260, Linthorpe Road, Middlesbrough.—Trustee, Mr. C. L. Townsend, Official Receiver, 80, High Street, Stockton-on-Tees, released October 6th.

E. G. Batt, electrical engineer, 20, Iverna Gardens, Kensington, and Magnet House, Kingsway, W.C.—Last day for proofs for dividend October 29th. Trustee, Mr. H. E. Cooper, 1-2, Bucklersbury, E.C.

R. V. Sellers (wireless supplies and installations), wireless engineer, Town Hall Buildings, Banbury.—First and final dividend of 5s. 1½d. in the £, payable October 22nd, at the Official Receiver's Offices, 37, Cornmarket Street, Oxford.

J. Atkins (J. Atkins & Co.), electrical engineer, 59, Church Street, Tewkesbury, and The Electricity Works, North'each.—First dividend of 3s. in the £, payable at Coventry House, South Place, E.C.

Company Liquidations.

Erith Electrical Co., Ltd.—A meeting of members is called for November 14th, at 41, Finsbury Square, E.C., to hear an account of the winding up from the liquidator, Mr. H. C. Merrett.

Refty Electrical Appliances, Ltd.—A meeting of members is called for November 14th, at the offices of Messrs. Owen Partridge & Co., 109, Kingsway, W.C., to hear an account of the winding up from the liquidator, Mr. R. O. McGown.

Advertising Salesmanship.

At a meeting of the Institution of Rubber Industry held at the Engineers' Club on Monday last, Mr. W. H. Hadley read a paper on "What Advertising Salesmanship can do for the Rubber Industry."

Book Notices.

The Dawson "Little Red Book" has been received, containtaining the annual subscription rates of over 5,000 publications which can be obtained through the agency of Messrs. W. Dawson & Sons, Ltd., Cannon House, Breams Buildings, London, E.C.

E.P.E.A. Technical Series.—The first two publications of a new series by the Electrical Power Engineers' Association are now available, price 1s. each. No. 1, "The Operation of Electrical Protective Devices," by D. A. Murphy; No. 2, "Super-Tension Cables," by C. Vernier, M.I.E.E. Both are reprinted from the *Electrical Power Engineer*.

"Overhead Systems Reference Book," prepared by a special Committee of the Overhead Systems Committee, Engineering National Section of the N.E.L.A. Pp. 592; figs. 688. New York: National Electric Light Association. Price $7.50.

"The Electrical Equipment of Automobiles," by Dr. S. Parker Smith. Pp. xi+128; figs. 58. London: Chapman and Hall, Ltd. Price 5s. net.

"Electric Power Equipment," by J. G. Tarboux. Pp. xi+455; figs. 374. London: McGraw-Hill Publishing Co., Ltd. Price 25s.

"Interaction of Pure Scientific Research and Electrical Engineering Practice," by J. A. Fleming. Pp. x+235; figs. 64. London: Constable & Co., Ltd. Price 15s. net.

"*Journal* of the Institution of Electrical Engineers." Vol. LXV. October, 1927. London: E. & F. N. Spon, Ltd. Price 10s. 6d.

"Quarterly Trade Survey." October, 1927 (Vol. I, No. 3). 37 pp. London: British Electrical and Allied Manufacturers' Association. Price 5s. net

The Newcastle E.S. Co.'s New Premises.

We have already made reference to the new headquarters of the Newcastle-upon-Tyne Electric Supply Co., Ltd., in

Carliol House.

Market Street, Newcastle, and we are now able to reproduce a photograph of the building (Carliol House), which is nearing completion.

Catalogues Wanted.

Messrs. J. L. Etheridge & Co., Dour Street, Dover, ask for catalogues of electrical and radio accessories and appliances.

Registered Electrical Contractors.

The following applications for registration were accepted by the Executive Committee of the National Register of Electrical Installation Contractors on October 14th:—

London, A., Manchester.
Johnson & Co., Bradford.
Burbidge, E. B., Hawkhurst, Kent.
Fraser Mares, Ltd., Cardiff.
Cluetts', Tarporley, Ches.
Winstanley & Barnett, Liverpool.
Hampton, Walter, Stafford.
Birks & Sons, Gerrards Cross.

At the same meeting six applications were declined.

Sale.

Owing to voluntary liquidation, Messrs. Lowke & Sons, Ltd., wireless and electrical goods dealers, of 87 & 89, Abington Street, Northampton, are realising their stock by a special sale.

Prices of Raw Materials.

The following prices are only general, and they may vary according to quantities and other circumstances :—

	CHEMICALS, &c.	Price October 17th	Fortnight's inc. or dec.
a	Acid, Oxalic ... ... per lb.	5¾d.	...
a	Ammoniac, Sal ... ... per ton.	£60	...
a	Ammonia, Muriate (large crystal) ,,	£52	...
a	Bisulphide of Carbon ... ... ,,	...	...
a	Borax ... ... ,,	£25	...
a	Copper Sulphate ... ... ,,	£25 10s.	...
a	Potash, Chlorate ... ... per lb.	4d. to 4½d.	...
a	,, Perchlorate ... ... ,,	5½d.	...
a	Shellac ... ... per cwt.	£13 10s.	...
a	Sulphur, Commercial ... ... ,,	£11	...
a	,, Roll ... ... ,,	£11	...
a	Soda, Chlorate ... ... per lb.	3¼d. to 3½d.	...
a	,, Crystals ... ... per ton.	£5 to £5 5s.	...
a	Sodium Bichromate, casks ... per lb.	3¼d.	...
	METALS, &c.		
b	Aluminium, Ingots ... ... per ton.	£107 to £112	...
b	,, Wire ... ... per lb.	1/6 to 2/-	...
b	,, Sheet ... ... ,,	1/3 to 2/9	...
p	Babbitts Metal and Anti-friction Metal—		
	Grade I ... ... per ton net.	£234	£4 dec.
	Grade II ... ... ,,	£162	£3 dec.
	Grade III ... ... ,, ,,	£85	£1 dec.
c	Brass (rolled metal 2" to 12" basis) per lb.	9¼d.	...
c	,, Tubes (solid drawn) ... ... ,,	11½d. to 11¾d.	...
c	,, Wire, basis ... ... ,,	9¾d.	...
c	Copper Tubes (solid drawn) ... ,,	1/0½	...
c	,, Bars (best selected) ... per ton.	£86	...
c	,, Sheet ... ... ,,	£96	...
c	,, Rod ... ... ,,	£86	...
d	,, (Electrolytic) Bars ... ,,	£62 15s.	17s. 6d. inc.
d	,, ,, Sheets ... ,,	£143 10s.	...
d	,, ,, Wire Rods ,,	£73 15s.	17s. 6d. inc.
d	,, ,, H.C. Wire per lb.	9⅞d.	¼d. inc.
f	Ebonite Rod ... ... ,,	2/3 to 2/6	...
f	,, Sheet ... ... ,,	2/3 to 2/6	...
n	German Silver Wire ... ... ,,	2/2	...
h	Gutta-percha, fine ... ... ,,	8/-	...
h	India rubber, Para fine ... ... ,,	1/2	...
l	Iron Pig (Cleveland No. 3.) ... per ton.	75/-	...
l	,, Wire, galv. No. 8, P.O. qual. ,,	£21	...
g	Lead, English pig ... ... ,,	£22 5s.	10s. inc.
g	Mercury ... ... per bot.	£22 15s.	15s. to £1 inc.
e	Mica (in original cases) small ... per lb.	3d. to 3/-	...
e	,, ,, medium ,,	4/- to 8/-	...
e	,, ,, large ... ,,	10/- to 20/- & up.	...
p	Phosphor Bronze, plane castings ,,	1/3½	...
p	,, ,, drawn bars & rods ,,	1/3	...
p	,, ,, rolled strip & sheet ,,	1/2½	...
p	,, ,, wire... ... ... ,,	1/3½	...
o	Platinum ... ... per oz.	£14 10s.	...
d	Silicium Bronze Wire ... ... per lb.	10½d.	...
r	Steel, Magnet, in bars ... ... ,,	7½d.	...
n	Tin, Block (English) ... ... per ton.	£262 to £262 10s.	£6 to £6 5s. dec.
n	,, Wire, Nos. 1 to 16 ... ... per lb.	4/2	5d. dec.

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

Reporting on October 15th, Messrs. James Forster & Co. stated that the week's advance in lead could not be ascribed to any change in the general position in this country. Stocks were still very large, arrivals considerable, and demand only moderate. The beginning of the movement was purely one of sympathy with other metals, particularly with copper and spelter, but the rise was later assisted by purchases of lead by consumers in this country and by Russia on the Continent. The Board of Trade returns for September, 1927, were :—Imports, 26,007 tons; exports, 1,919 tons; leaving for home consumption 24,088 tons.

Lighting and Power Notes.

Aughton.—ELECTRICITY SUPPLY.—The Parochial Committee is applying for an Order to supply electricity in the parish. A report by Mr. J. Scott, electrical engineer of Liverpool, shows that Aughton would take a bulk supply from the main which will supply the neighbouring township of Maghull. The price per kWh would be about 7d., but this would be considerably reduced in the case of large consumers. The parishes of Maghull and Lydiate would have a supply of electricity by Christmas and Aughton would receive a supply within three months of the granting of the order.

Bradford.—YEAR'S WORKING.—We have received from Mr. T. Roles, city electrical engineer, a copy of his report, together with the statement of accounts on the working of the city electricity undertaking for the year ended March 31st last. The total revenue amounted to £576,161, as compared with £494,388 in the preceding year. Working expenses increased from £273,753 to £350,755, for which the higher cost of fuel was largely responsible, and the gross profit was £225,406 (£220,635), to which was added an unemployment grant of £1,014, making a total of £226,420. After payment of capital charges, &c., there was a net surplus of £20,751, as compared with £21,210 in the previous year. A contribution of £19,000 was made to the city fund. The capital expenditure during the year amounted to £150,466, the bulk of which was spent on mains. The electrical energy sold increased from 73,448,196 to 77,461,658 kWh, and the average price obtained per kWh from 1.534d. to 1.703d. Sanction was received during the year to the installation of one 2,500-kW and one 25,000-kW turbo-alternators, and additional boiler plant. A scheme for the hire of cookers was commenced in April, 1926, and up to the end of the year under review 700 cookers had been installed under this scheme. Since the end of March last, 400 additional cookers have been let out on hire.

Bromley (Kent).—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £4,059 for mains and services.

Brigg.—ELECTRICITY SUPPLY.—The Scunthorpe Urban District Council has offered to supply the Urban Council with electricity at 7d. per kWh for lighting and at 2½d. per kWh for power if the latter body will guarantee to take 90,000 kWh for lighting and 30,000 kWh for power.

Carlisle.—LOAN.—The City Council has applied for sanction to a loan of £3,423 for extending the mains to supply electricity to the Botcherby and Raffles housing estates.

Continental.—POLAND.—The Polish branch of the Brown-Boveri Co. is reported to have secured the concession for the establishment and working of a central electric power station in the town of Ober-Lazisk in Eastern Upper Silesia. A group of Swedish banks is stated to be financing the undertaking to the extent of £480,000.

AUSTRIA.—According to a return lately issued by the Water Power and Electricity Department of the Austrian Government, there were 199 hydro-electric power stations with a capacity of over 500 h.p. each in operation in Austria at the end of 1918, with a total installed turbine capacity of 294,500 h.p. Since then, to the end of 1926, 71 new plants, with an aggregate turbine capacity of 270,200 h.p., have been put into operation. At the commencement of the present year eighteen power stations, with a turbine capacity of 474,500 h.p., were in course of construction.

The Austrian Government has recently granted a concession to the Kreditanstalt fur Verkehrsmittel of Berlin, for the establishment of a large hydro-electric power station to utilise the water power of the River Enn.

ITALY.—Two more 10,000-kVA transformers have recently been installed at the power station of the Società Generale Elettrica del Adamello, of Milan, bringing the total up to five sets of that capacity. The transformers, which step down electricity from 117,000 to 70,000 V, connect the company's new 125-kV line from various power stations in the Alps with the old 70-kV network, and are provided on the 70-kV side with extra tappings brought through the cover, giving approximately 5 per cent. voltage variation.

Costa Rica.—ELECTRICAL DEVELOPMENT.—Among the contracts recently completed by the A.E.G., of Berlin, is the equipment of a 6,000-h.p. hydro-electric power station near San Jose, to utilise the water power of the River Virilla. The plant comprises three 2,000-h.p. turbo-generators, together with transformers to step up the current from 6,600 to 33,000 V.

Crewe.—STREET LIGHTING.—The Town Council has decided to extend electric lighting along Ford Lane and the streets off that thoroughfare, at an estimated cost of £1,300.

Dorchester.—PROPOSED EXTENSIONS.—The Corporation has instructed the electrical engineer to prepare plans for plant extensions at the generating station for consideration in the new year.

Edinburgh.—YEAR'S WORKING.—We have received from Mr. E. Seddon, engineer and manager of the Corporation electricity undertaking, a copy of his report, together with the accounts for the year ended May 15th last. The total revenue amounted to £584,177. The coal dispute was responsible for an increase in the cost of fuel from £63,776 to £156,758, and the total working expenditure was £380,107, leaving a gross profit of £204,070. Capital charges absorbed the whole of this surplus, and there was a net deficit of £15,028, a sum being transferred from reserve to meet the deficiency. The capital expenditure during the year amounted to £168,243, and included £85,855 for mains and cables (including transformers), £21,870 for sub-station plant and machinery, and £45,492 for lands and buildings at Portobello station. The total now expended on the undertaking stands at £3,781,179. The sales of electrical energy increased from 79,776,110 to 91,484,739 kWh, and the maximum load from 40,700 to 43,277 kW. Work in hand at the end of the year included extensions to the turbine and boiler house at Portobello to accommodate two 25,000 kW turbo-alternators, with condensing plant and boilers. Seven new sub-stations were put into commission during the year.

Earby.—Electricity in Bulk.—Nelson Town Council has submitted terms to the Urban District Council for a bulk supply of electricity.

Gillingham (Kent). — Loan Sanctioned. — The Town Council has received sanction to a loan of £10,000 for mains and services.

Hastings.—Inquiry.—An inquiry was held at the Town Hall on October 11th by Sir William Marwood, for the Ministry of Transport, into objections raised by landowners in connection with the Corporation's scheme for supplying electricity to Rye, Battle, Ninfield, Winchelsea, and other places. The Town Clerk stated that the Corporation had been granted an Order authorising it to supply in the proposed area. It was intended to erect a 22,000-V overhead cable at a cost of £700 per mile. To lay it underground it would cost £2,300 per mile. The local authorities had approved the scheme. The objections were either against the amount of compensation (1s. for each pole), damage to value of property, or damage to amenities. The Ministry will give its decision in due course.

Hounslow.—New Plant.—The Urban District Council is applying for sanction to a loan of £21,200 for new plant at the electricity works, for the reception of a bulk supply of electricity from the Metropolitan Electric Supply Co., Ltd.

Hull.—Loan Sanctioned.—The Corporation Electricity Committee has received sanction to the borrowing of £77,500 for sub-stations and equipment.

Ilminster.—Electricity Supply.—Dr. Purves attended a meeting of the Urban District Council on October 5th with reference to an electricity scheme for the district. He stated that he had made arrangements with the Crewkerne Urban District Council to apply for an Order to include the town and certain parishes in the neighbourhood, and he thought it might be desirable to include Ilminster. The price per kWh would not exceed 10d. It was agreed that Ilminster should be included, and the amended draft order forwarded to the Council for consideration.

Inverness.—Electricity Accounts.—The Town Council recently took over the electricity undertaking and the Convener of the Electricity Committee reports that for the period of ten months the gross income amounted to £22,567 and the expenditure after making provision for payment of income tax, to £15,781.

Kirkham. — Electricity Supply. — The Urban District Council has accepted the offer of Preston Corporation to supply the district with electricity.

Leatherhead.—Electricity Order.—A Special Order to extend its area of electricity supply has been granted to the Leatherhead and District Electricity Co., Ltd. The maximum price throughout the area of supply is to be 10d. per kWh for lighting, with minimum quarterly charges of 12s. 6d. for the winter and 8s. 4d. for the summer, and 5d. per kWh for all other purposes.

Lincoln.—Electricity Charges.—The Town Council has decided to supply electricity for cooking purposes to houses, the annual rateable value of which exceeds £55 a year, at a flat rate of 1d. per kWh. The domestic flat rate of 1½d. per kWh for such houses has been withdrawn, and ordinary rates will be charged for lighting and other purposes.

Liverpool.—Loan Sanctioned.—The Tramways and Electric Power and Lighting Committee has received sanction to the borrowing of £83,034 for the provision of mains and services for the Norris Green housing estate.

Llandudno.—Appointment of Consulting Engineer.—The Electricity Committee has recommended the engagement of Mr. A. M. Sillar as consultant in connection with proposed extensions, at a fee of 100 guineas.

Mexico.—New Station.—The Mexican Light and Power Co., Ltd., has recently commenced work on the establishment of a new hydro-electric power station which will have a capacity of 100,000 h.p., to utilise the water power of the River Lerma.

Newport (Mon.).—Year's Working.—The accounts of the Corporation electricity undertaking (engineer, Mr. A. N. Moore) for the year ended March 31st last show a total income of £174,934, as compared with £169,191 in 1925-26. The coal dispute was responsible for a considerable increase in the cost of fuel, and working expenses therefore rose from £95,658 to £130,436, with a consequent decrease in the gross profit from £73,533 to £44,498. To this surplus was added interest of £3,405, making a total of £47,903 available, and after payment of capital charges there was a net deficit of £15,483, as compared with a profit of £17,771 in the preceding year. The capital expenditure during the year amounted to £72,582, and the total now spent on the undertaking stands at £917,459. The sales of electrical energy increased from 24,547,151 to 24,705,172 kWh, and the average price obtained per kWh from 1.539d. to 1.596d.

Palestine.—Electricity Concession.—The Hague International Court on October 10th gave judgment, by a majority of seven to four, in support of the British objection to its jurisdiction in the case of the Jerusalem concessions to the Greek contractor, M. Mavromatis, and therefore against M. Mavromatis in his claim for £217,000 and interest at 6 per cent. from the date of his application, says the *Daily Mail*. M. Mavromatis's claim against the British Government was for compensation for alleged losses incurred in respect of concessions for the electric lighting and water supply of Jerusalem, obtained by him from the Turkish Government before the war, the validity of which was disputed by the Colonial Office.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

Llandudno.—Lighting: From 5d. to 4d. per kWh. Minimum charge: From 5s. to 1s. per quarter.

Heckmondwike.—Lighting: From 6d. to 5d. per kWh.

Hamilton.—Lighting: From 6½d. to 6d. per kWh. Heating (separately metered): From 1½d. to 1d. per kWh.

Rawtenstall.—Year's Working.—The accounts of the Corporation electricity undertaking (engineer, Mr. C. L. E. Stewart) for the year ended March 31st last, record a total income of £69,294, as compared with £56,249. Working expenses amounted to £44,244, as against £30,687, leaving a gross profit of £25,050 (£25,562), to which was added revenue from other sources, making a total of £25,344. Capital charges absorbed £20,209, and there was a net surplus of £5,135, as compared with £6,276 in 1925-26. The sales of electrical energy increased from 10,882,942 to 11,346,056 kWh, and the average price obtained per kWh from 1.20d. to 1.42d.

South Africa.—Uitenhage (Cape Province).—Arrangements have been completed, as the result of negotiations between the Electricity Supply Commission, the Municipal Council and the Railway Department, for a bulk supply from Port Elizabeth for both municipal and railway workshop purposes. Both the municipality and the railway department have at present their own plants, but these are inadequate for the existing requirements.

South Shields.—Year's Working.—The report of the borough electrical engineer (Mr. J. Edgar) on the working of the Corporation electricity undertaking for the year ended March 31st last, shows a total income of £94,210, as compared with £87,192 in the preceding year. Working expenses amounted to £59,202, as against £46,166, leaving a gross profit of £35,008 (£41,026). After meeting capital charges there was a net surplus of £5,129, as against £17,011 in 1925-26. The capital expenditure during the year amounted to £111,211 the chief items being £46,295 for mains, and £22,534 for the assisted wiring scheme. The electrical energy sold decreased from 8,513,818 to 8,300,961 kWh, for which the reduced supply for traction purposes was responsible. The number of consumers connected under the assisted wiring scheme, since its inception in May, 1925, amounts to 11,700, which augmented the income for the year under review by £22,181.

Spalding.—Factory Supply.—The Urban District Council has agreed to supply electricity to a local beet sugar factory subject to the latter undertaking to take a supply of electricity for 15 years and on guaranteeing a minimum payment of £275 per annum. A loan of £900 to extend the mains to the factory has been applied for.

Special Order.—The Electricity Commissioners have submitted to the Minister of Transport for confirmation, a Special Order made by them authorising the Urban Electric Supply Co., Ltd., to supply electricity in the rural districts of Newbury and Kingsclere.

Stafford.—Extension of Supply.—The Town Council has agreed to the laying of a main from the Universal Grinding Wheel Co.'s works for the supply of electricity to Doxey, the estimated cost being £1,900.

Tilbury. — Electricity Charges. — The Urban District Council has fixed the following scale of charges for electricity:—Lighting: 6d. per kWh, with minimum charges of 11s. 3d. per winter quarter and 7s. 6d. per summer quarter. Heating and power, where light is also taken: 1½d. per kWh. All purposes, domestic use only: 2d. per kWh, with a rebate of ½d. per kWh to consumers of over 1,440 kWh per annum, subject to a minimum charge of 15s. per quarter. Business use and "all purposes" scale: 6d. per kWh for the first 100 kWh per quarter per kW installed; 5d. for the next 100 kWh, 4d. for the third 100 kWh, 3d. for the fourth 100, 2d. from 401 to 800 units, and 1½d. beyond, with a minimum charge of 25s. per quarter.

Torquay.—Loan Sanctioned.—The Town Council has received sanction to a loan of £1,571 for transformers. Overhead mains are to be erected to supply electricity to the village of Ipplepen at an estimated cost of £1,040.

Tunbridge Wells.—Loan Sanctioned.—The Town Council has received sanction to a loan of £16,043 for extensions to the generating station.

Electricity Charges.—The following variations in the charges for electricity have been made:—Lighting: 5d. per kWh. Heating and power: 1d. per kWh. Domestic rates: ½d. per kWh. Extended shop-window lighting: 1d. per kWh.

Proposed Showrooms.—The Council is applying for powers to equip electricity showrooms.

Tramway and Railway Notes.

Blackburn.—RESULT OF 1d. FARES.—At a recent meeting of the Town Council it was reported that the introduction of 1d. fares on the trams had resulted in a decrease of revenue, but the experiment would be continued for the full period of six months, when the Town Council would be able to analyse the position and act accordingly.

Blackpool.—NEW CARS.—The tramway manager having reported on the necessity of additional and improved rolling stock on the Fleetwood-Blackpool route for next season, the Tramways Committee has approved the purchase of ten Pullman cars.

Continental.—NORWAY.—The electrification of the railway between Oslo and Drammen has now been followed by the completion of the electrification of the line between Oslo and Lillestrom. The electric locomotives each weigh about 62 tons and have been constructed in Norway, while the plant at the transformer station, which receives energy from the Hakavik and Raanaafoss hydro-electric works, was obtained from Germany.

POLAND.—It is stated that the arrival is expected shortly in Warsaw of representatives of Belgian financiers who seek to take an interest in the proposed electrification of the suburban railways of Warsaw. Negotiations with the same group some time ago failed to bring about an agreement, but they are now to be continued. The expenditure on the work is estimated at 64,000,000 zloty.

Newport (Mon.).—YEAR'S WORKING.—The report of the general manager of the Corporation tramway undertaking (Mr. N. J. Young) on the working of the undertaking for the year ended March 31st last, records a total revenue of £95,110, as compared with £110,917 in the preceding year, the general strike and the coal dispute being responsible for the reduction in receipts. Working expenses amounted to £75,871, as against £82,251, leaving a gross profit of £19,239 (£29,666), to which was added interest of £3,967, making a total of £23,207. Capital charges absorbed the whole of the gross profit, and there was a net deficit of £7,390, as compared with a surplus of £3,846 in the previous year. The number of passengers carried decreased from 17,262,187 to 14,805,270, and the car-miles run from 1,285,707 to 1,202,510.

Preston.—NEW CARS.—A new type of double-decker car, specially designed to clear railway bridges, has been placed on the Ashton route by the Corporation Tramways Department. The car has been adapted and built at the depôt. It is intended to place similar cars on the route as they are constructed.

Stoke-on-Trent.—TRAMWAY AGREEMENT.—According to the *Manchester Guardian*, a tentative agreement was reached on October 11th between the Stoke-on-Trent Corporation and the Potteries Electric Traction Company for the abandonment by the company of the tramway system in return for a number of motor omnibus licences. A dispute has existed for a long time on the question, and yesterday Sir Henry Maybury, of the Ministry of Transport, presided at a private conference between a special committee appointed by the Corporation and representatives of the Company. The proceedings lasted throughout the day, and at the close the Town Clerk announced that an agreement had been arrived at. The committee will recommend the City Council at its next meeting to approve the agreement. It is expected that the Council will concur.

Walthamstow.—LOAN.—The Urban District Council has applied to the Ministry of Transport for sanction to a loan of £14,140 for the reconstruction of the tramway track in Woodford New Road.

Telegraph and Telephone Notes.

India.—"BEAM" RADIO-TELEGRAPHY.—An interesting illustration of the value of wired-wireless in countries where telegraph lines have to pass over rough and exposed country and are liable to develop faults through exposure to strong winds and storms, comes from India. The Central Telegraph Office is at Bombay, and the "beam" wireless transmitting station at Kirkee, Poona, signals between the two stations being conveyed over the telegraph lines by means of wired-wireless. On September 14th, according to the *Times of India*, there was a "very bad breakdown of the trunk telephone between Bombay and Poona, which was not put right till the following morning." While the wires could not be of any service for telephone communication after the breakdown, the "beam" wireless service, which is also using the Government trunk lines for transmitting messages to Kirkee, experienced no difficulty in putting through hundreds of words over the same incapacitated wires. While speech uttered into the telephone mouthpiece could not pass beyond the spot where the break had occurred, the "beam" signals jumped over the breach, a very clever adaptation of the latest advances of wireless science to land-line signalling.

Long-distance Telephony.—LONDON-MEXICO CIRCUIT.—As was hinted some time ago, it will shortly be possible to put through a telephone call from Great Britain to Mexico City and other Mexican centres. This important new link in the international chain has been added by the ceremonial opening last week of the new Mexico-United States cable. An agreement concluded between the American and Mexican telephone companies extends to Mexico the facilities of the Transatlantic circuit.

Poland.—INTERNATIONAL TELEPHONY.—An agreement has been signed between the Post and Telegraph Departments of Poland and Russia with regard to the establishment of telephone communication between the two countries. For the moment four lines only will be opened, namely, Warsaw-Moscow, Warsaw-Minsk, Moscow-Baranowitche and Baranowitche-Minsk. Further lines will be established as required, and those projected will be reserved for local conversations on the same terms as international conversations, between the hours of 10 a.m. and noon and 14 and 15 o'clock; at the other times, international conversations will enjoy priority in accordance with the International Telegraph Regulations. The fees for an ordinary conversation of three minutes between Warsaw and Moscow will be 9.60 gold francs. The agreement provides for communication between Berlin and Moscow *via* Poland, a conversation of three minutes being charged 70 gold francs.—*Reuter* (Warsaw).

The Telephone Service.—GLASGOW PROGRESS.—In an address to Glasgow Rotarians Mr. A. E. Coombs, telephone district manager, dealt with the service from within. In each week of 1927, compared with the corresponding week of last year, he said, they were dealing with 60,000 more calls, of which half would be represented by new subscribers and half by increased uses of existing subscribers. The number of working telephones was being increased by 55 per week, but they would not rest content until they raised the rate to at least 100 per week. Their revenue was increasing at the rate of £650 per week, compared with similar periods of 1927 and 1926. He had obtained permission for a trained telephone official to visit houses and other premises in cases of the Post Office and the subscriber experiencing delay in establishing rapid telephone communication.

Radio Notes.

Australia.—NEW RADIO DEPARTMENT.—The Commonwealth Government is creating a separate branch of the Postmaster-General's department to deal with wireless activities. The *Electrical Engineer of Australia and New Zealand* explains that hitherto the wireless business of the department has been controlled, together with the telegraph service, by one branch, under Mr. J. Malone, chief manager of telegraphs and wireless. Under the new arrangement a new office is being created (that of chief inspector, wireless branch) with a salary of from £720 to £792 a year, and the wireless staff will be separated from the telegraph branch and placed under the supervision of the new officer.

SHORT-WAVE STATION.—Arrangements have been made by the Associated Radio Company to erect a short-wave broadcasting station as an adjunct to the Melbourne station, 3AR, which will use a wave of 55 metres. The power to be used at the outset will be 250 watts.

Holland.—NEW STATION.—It is reported that the new transmitting station at Huizen, which has been built by the Protestant and Catholic Radio Group, is to be inaugurated on October 22nd. It will use a wave-length of 1,840 metres.

SHORT-WAVE STATION.—The Philips Co.'s short-wave experimental transmitting station, PCJJ, is being removed from Eindhoven to Hilversum, and, in consequence, the transmissions will be interrupted for about six weeks whilst the transmitter is dismantled and reinstalled at the new station. The last transmission from Eindhoven took place on Tuesday, the 18th inst., from 16-1 Greenwich mean time.

Licensing.—MIDLAND POLICY.—A meeting of licensing authorities throughout the Midland counties is to be held at Birmingham in October for the purpose of arriving at a uniform policy with regard to the installation of wireless receiving sets in public houses throughout the area. At present many applications to install sets are refused by the magistrates.

Wavelength Changes.—TIDAL INFLUENCE.—Variations of the transmitter frequency of station WCGU, at Sea Gate, Coney Island, U.S.A., are due to the rise and fall of the tides, according to Mr. Richard W. Daniels, chief engineer of the station. Tests with a laboratory oscillator showed, says the *T. & T. Age*, that during ebb tide the wavelength decreased to 210 and a fraction metres and that midway between this and flood tide it decreased from two to four half-kilocycles, thus increasing the wavelength to 211.6 metres, which is more than the wavelength prescribed for the station by the Federal Radio Commission. The aerials of WCGU are 75 ft. from the breakers, which, combined with the fact that the sand, when wet, becomes an excellent conductor of high-frequency current, according to Engineer Daniels, adds capacity to the antenna while reducing its effective height. The operators are obliged constantly to check the wavelength of the station because of this peculiar condition.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the Electrical Review containing the advertisement is given in parentheses below.

Contracts Open.

Australia. — Melbourne. — November 16th. Electricity Supply Committee. H.p. and l.p. 3-phase sub-station switchgear. (B.X. 3854.)*

Sydney.—November 7th. Municipal Council. High-voltage testing equipment. (Specification No. 1,154.)

December 7th. N.S.W. Government Railways. Three 5-ton and one 25-ton electric travelling cranes.

Birmingham.—November 1st. Electric Supply Department. 100,000 yd. 3-core, 33,000-V cable and 35,000 yd. telephone cable. (October 14th.)

Bradford. — November 12th. Tramways Committee. Stores, including electrical fittings for tramcars, insulating material, &c., for 12 months. Mr. R. H. Wilkinson, general manager, 7, Hall Ings, Bradford.

Edenfield (near Bury).—The installation of electric lighting in the Parish Church is proposed, and the diocesan architect is to prepare a specification and estimate of the cost.

Egypt.—Cairo.—November 26th. Ministry of the Interior. One 128-kW Diesel engine-driven electrical installation for the town of Simbellawein. (B.X. 3885.)*

Egyptian State Railways.—Chief Inspecting Engineer, Queen Anne's Chambers, Broadway, Westminster, S.W.1. Telephone materials.—*Reuter's Trade Service* (Cairo).

Grimsby.—October 26th. Electricity Department. Four kiosks and equipment. (October 7th.)

Helmington Row (Crook, Durham).—October 25th. Auckland, Shildon and Willington Joint Hospital Board. Electric lighting installation at the isolation hospital. Mr. S. Adams, clerk.

London. — Central Electricity Board. — October 24th. 132,000-V overhead transmission lines for the Central Scotland Electricity Scheme, 1927. (September 23rd.)

Southwark.—October 25th. Electricity Department. Cables for 12 months. (September 23rd.)

Metropolitan Asylums Board.—November 2nd. One direct-coupled petrol-paraffin engine, and 5-kW dynamo for the Goldie Leigh Holmes, Abbey Wood, S.E.

New Zealand.—Wellington.—January 10th, 1928. Public Works Department. Additional 110,000-V switchgear, steelwork and control board for Arapuni electric power supply. (B.X. 3837.)*

January 17th. 110,000-V switchgear, protective apparatus, steelwork, storage batteries, &c., for the Waikaremoana power scheme. (B.X. 3858.)*

Oldham.—October 26th. Health Committee. Electric lighting installation, Greenacres Maternity Home. Specifications from borough engineer and surveyor, Town Hall.

Stockport.—November 11th. Electricity Department. One water-tube boiler with all accessories. (October 7th.)

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Birmingham.—General Purposes Committee. Accepted:—
Installation of electric lighting at Selly Park School, Reynolds & Bradwell; Hastings Road School, Lea, Son and Co., Ltd.; Paget Road School, T. Glover.
Automatic rotary convertor equipments for Duke Street sub-station.—General Electric Co., Ltd., and Parsons and Morrin.

Bournemouth.—Town Council. Accepted:—
Reconstruction of the Wimborne Road tramways at £8,498.—William Griffiths & Co., Ltd.

Bradford.—Tramways Committee. Accepted:—
Rewinding six tramcar motors (£83).—English Electric Co., Ltd.
Mild steel coal bunker for Valley Road power station.—Frederick Fox, Ltd.

Chesterfield.—Electricity Committee. Accepted:—
Machine tools for fitting shop (£362).—Needham Bros. and Co., Ltd.
Transformer kiosk and switchgear (£332).—English Electric Co., Ltd.
Switch cubicle (£138).—Johnson & Phillips, Ltd.

Doncaster.—Education Committee. Accepted:—
Electric lighting installation, Balby Infants' School.—J. W. Hanson & Co.

Dumfries.—Town Council. Accepted:—
Installing electric light at 130 houses at Balmoral Park.—Mr. John D. Marshall.

Hounslow.—U.D.C. Electricity Department. Accepted:—
Plant in connection with the bulk supply of electricity (£16,488).—General Electric Co., Ltd.

Kirkintilloch.—Town Council. Accepted:—
Electrical work at Townhead School.—N. Russell & Co., Ltd.

London.—Metropolitan Asylums Board. Recommended:
Alterations to electric light at Queen Mary's Hospital.—Uneedus Electrical Co. (£294, less £31 for old lamps and transformers).
X-ray apparatus at Tooting Bec Hospital (£173).—Solus Electrical Co.

Metropolitan Water Board. Accepted:—
Two electric motors for Surbiton Filter Works (£92).—Bull Motors, Ltd.

London County Council Stores and Contracts Committee.—Accepted:—
Electric fittings (Schedule No. 14).—Baxter & Caunter, Ltd., British Insulated Cables, Ltd., Drake & Gorham Wholesale, Ltd., Edison-Swan Electric Co., Ltd., and J. H. Tucker & Co., Ltd.

St. Pancras.—Contracts Committee. Recommended:—
Switchgear in connection with the installation at Carreras' factory (£4,582).—A. Reyrolle & Co., Ltd. Cable (£8,684)—Hackbridge Cable Co., Ltd.

Shoreditch.—Lighting Committee.
Electrical installation for 48 tenements at Horner House (£650).—City Electrical Co. (Accepted.)
Distributing mains (£3,380 approx.).—W. T. Glover & Co., Ltd.

Marlborough.—Town Council. Accepted:—
New switch panel for the Power Station (£105).—James Bros.

New Zealand.—According to the Australian Press, the remaining tenders in connection with the electrification of the Christchurch-Lyttelton railway have been placed with Messrs. Cory-Wright & Salmon acting on behalf of the English Electric Co., Ltd., of London. Three sections are embraced in this contract, covering locomotives, sub-station and overhead equipment. The total amount of the contract is £90,000.

Paisley.—Education Committee. Accepted:—
Electrical installation at East School.—J. Bell & Son.

Rotherham.—The Town Council has jointly with the Sheffield Corporation accepted the tender of Messrs. Glover and Co., Ltd., for the supply and laying of e.h.p. cables, pilot cables and ducts, for the linking up of the Blackburn Meadows generating station with the Prince of Wales generating station (£17,463), and that of Ferranti, Ltd., for transformers at £9,000.

South Africa.—Durban.—According to *Reuter*, the Electricity Committee has accepted a German tender for eight transformers at £20,056. The lowest British quotation was £25,126.

Walsall.—Town Council. Accepted:—
Extension of the Birchills generating station and the interlinking scheme.
C.I. pipes, valves, &c. (£12,617).—Currall, Lewis & Martin, Ltd.
E.h.p. feeders (£1,500).—Callender's Cable & Construction Co., Ltd.
Additional switchgear (£1,141).—Metropolitan-Vickers Electrical Co., Ltd.

Forthcoming Events.

British Electrical Development Association.—Friday, October 21st. Royal Society of Arts. 7.30 p.m. "American Lighting Service Methods." Mr. W. E. Jones.

Institute of Cost and Works Accountants. — Friday, October 21st. Connaught Rooms, Great Queen Street, W.C. Sixth National Conference. 10.30 a.m. "How Cost Accounting Reduces Costs." Mr. C. N. Matthews and Mr. J. R. Blyth. 2.30 p.m., "The Problem of the Half-filled Shop," Mr. A. Winder and Mr. W. B. Walker.

Institution of Mechanical Engineers.—Friday, October 21st. Storey's Gate, S.W. 6 p.m. Presidential address, Sir Henry Fowler.

Junior Institution of Engineers.—Friday, October 21st. 39, Victoria Street, S.W. 7.30 p.m. "Piling in general, with special reference to the Vibro Concrete Piling system." Mr. M. McCarthy. Tuesday, October 25th. Portman Rooms. 7 p.m. Bohemian smoking concert. Friday, October 28th. 39, Victoria Street. 7.30 p.m. Informal meeting.

Institution of Electrical Engineers.—INFORMAL MEETING.—Monday, October 24th. Institution, London, W.C. 7 p.m. Discussion on "What is required to ensure the Comprehensive Distribution of Electricity," to be opened by the president.

(Mersey and North Wales (Liverpool) Centre).—Monday, October 24th. The University, Liverpool. 7 p.m. Inaugural address by the chairman, Prof. F. J. Teago.

(North-Eastern Centre).—Monday, October 24th. Armstrong College, Newcastle-on-Tyne. 7 p.m. Inaugural address by the chairman, Mr. H. Paterson.

(East Midland Sub-Centre).—Tuesday, October 25th. The Guildhall, Derby. 6.45 p.m. "The Lanarkshire Hydro-electric Scheme." Mr. A. E. McColl.

(North-Western Centre, Students' Section).—Tuesday, October 25th. Milton Hall, Manchester. 7.30 p.m. Address by the Chairman of the N.W. Centre, Mr. A. B. Mallinson, on "Heat Extraction."

Electrical Power Engineers' Association (Southern Division).—Wednesday, October 26th. Institution of Electrical Engineers, London, W.C. 7 p.m. "Instruments and Meters for Bulk Supply and General Measurements." Mr. C. L. Lipman.

(Sheffield Section).—Wednesday, October 26th. Royal Victoria Hotel, Sheffield. 7.30 p.m. "A.C. Voltage Regulators." Mr. G. F. Porter.

Illumination Design Course.—Monday, October 24th. Lighting Service Bureau, 15, Savoy Street, W.C. 7.30 p.m. "Lighting Shops and Stores."

Institution of Engineers-in-Charge.—Wednesday, October 26th. St. Bride Institute, Bride Lane, E.C. 7.30 p.m. Presidential address. Mr. L. Pendred.

Physical Society.—Friday, October 28th. Imperial College of Science, South Kensington, S.W. 5 p.m. Ordinary scientific meeting.

Institution of Chemical Engineers.—Friday, October 28th. Institution of Civil Engineers, Gt. George Street, S.W. 6.30 p.m. "Crystallisation." Sir W. Bragg, F.R.S.

Faraday House Old Students' Association.—Friday, October 28th. Savoy Hotel, W.C. 6.30 p.m. Annual dinner.

Faraday Old Students' Association.—Friday, October 28th. Savoy Hotel, Strand, W.C. Annual dinner.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We should be glad to learn the names and addresses of makers of the following:—

BRITISH domestic iron.

Notes.

Gas v. Electricity.

An electricity *v.* gas controversy with some remarkable features has broken out at Hamilton, Lanarkshire. Some time ago the Corporation Gas Committee incurred considerable capital expenditure on mains, services, and meters in connection with municipal houses, and subsequently the Committee found that gas users had been canvassed for the installation of electric lighting. Over 40 tenants applied to the Electric Lighting Committee for the installation of electricity, and the Gas Committee reported to the Town Council that an adequate return would not be received by it if the houses were electrically lighted. Accordingly the Committee suggested that electric lighting should not be introduced into housing schemes unless with the concurrence of the Gas Committee. Naturally, the Electric Lighting Committee took a different view of matters, and considered favourably the request made to it to recommend the Council to lay the cables provided the tenants did the wiring. When the matter came before the Council strong objection was taken to the Gas Committee's suggestion that its approval should be obtained before electric light was introduced, and on a division this was defeated. It was also decided that the Electric Lighting Committee should reconsider the matter in view of information now available.

E.A.W. Activities.

Pursuing its work of popularising electrical equipment in the home, the Manchester District Branch of the Electrical Association for Women held a luncheon and conference on October 13th, when interesting speeches were made by Coun. Mrs. E. D. Simon and Mrs. H. C. Lamb (wife of the Electrical Engineer of the city). The Lord Mayor of Manchester, Ald. J. H. Swales, presided at the luncheon, and commended the use of electricity in the home as likely to reduce the smoke in the atmosphere by 50 per cent. Electricity in the home added to the comfort of the family and, in the factory, to the health of the workers.

Councillor Mrs. Simon said that electricity was the fairy godmother of the working woman, and she wanted electricity harnessed to the home.

Mrs. Lamb said that in a case of 50 subsidy houses there was only one gas fire, all the services of lighting, cooking, washing and so on being done by electricity at an average cost of seven guineas a year.

The Lord Mayor paid tribute to the work of Mrs. J. Harcourt Williams, the hon. secretary of the Manchester District branch.

In the morning 100 members of the conference attended the Electric Lighting Service Demonstration Bureau for the North-West Area, where Mr. R. C. Hawkins, the district officer, showed a variety of devices.

Dr. Christine Barrowman, of Newcastle-on-Tyne, gave an address suggesting that fear, the result of ignorance, prevented many women from using electricity in the home. She explained that danger was practically non-existent, and that women were finding electrical equipment an interesting study —particularly in adding to the artistic and decorative possibilities of home furnishing.

Dr. Ferranti also gave an address, in which he referred to the recent installation of ultra-violet-ray equipment in the works of his firm at Hollinwood. He said that all the glazing had been done with vita-glass, and although the past season had been a dull one, they had demonstrated how much sunshine had been cut off by the ordinary glass, and it was clearly established that the health of the workers had been improved by the effects of the ultra-violet rays.

The afternoon was spent in an inspection of Messrs. Ferranti's works.

On September 22nd the Birmingham and Midlands Branch of the Electrical Association for Women opened its autumn session with a lecture by Mr. Berry, M.I.E.E., on heating problems of to-day. Mr. Berry outlined his ideas of central heating combined with electric fires. On October 7th Professor Cramp, D.Sc., gave an interesting lecture to the above branch on "Fundamentals of Electricity." Many experiments were carried out.

Lecture.

Yesterday, Thursday evening, at the United Wards' Club of the City of London, Mr. Walter Rose, F.R.G.S., was to give an illustrated lecture on "The Romance of the Submarine Cable: its manufacture, laying, maintenance, and working."

The Overhead Lines Association.

The next general meeting of the Overhead Lines Association will be held at the Royal Society of Arts, at 5.30 p.m. on Wednesday, November 2nd. After the preliminary business, Mr. W. C. Bexon, M.I.E.E. (Ayrshire Electricity Board) will open a discussion on "Wayleaves." At the third meeting (date to be announced later) Mr. W. Fennell, M.I.E.E. (Mid-Cheshire Electricity Supply Co., Ltd.) will open a discussion on "Overhead Line Regulations." Correspondence in connection with the Association may be addressed to Mr. Theodore Stevens, hon. secretary, 50, Lincoln's Inn Fields, W.C.2. We are informed that, subject to confirmation at the general meeting, the following decisions have been arrived at by the provisional Committee:—Members of the Overhead Lines Association shall be engineers who have been, or are, personally responsible for the erection, maintenance and/or operation of overhead lines for the public or private supply of electricity. Associates shall be other persons interested who do not conform to the above conditions for the grade of member. Sectional committees are being formed in each provincial area (as defined by the I.E.E. for its purposes as local centres).

We are requested to invite the electrical engineer or manager of each company or corporation which is supplying electricity by means of overhead lines to send a copy of its wayleave form to the hon. secretary of the Association, with a view

to the comparison of the various versions and to the taking of joint action in the production of a standard wayleave form for Great Britain.

The inauguration of the Association received notice in a number of London and provincial newspapers, but in none was it so fully dealt with as in the *Daily Mail* of Friday last, which not only printed an article containing the essential facts, but also devoted its principal leader to the subject. Thus the newly-formed Association, even in the act of emerging from the embryo stage, has already brought the matter prominently before the eyes of millions of readers.

B.E.S.A. Publications.

The British Engineering Standards Association has recently issued two new British Standard Specifications, No. 8-1927, for tubular tramway poles, and No. 52-1927, for ordinary-size bayonet lampholders. The former is a revision of the original specification issued in 1904, which was very extensively worked to, both at home and in the colonies, and it was found that very little modification was required to bring the specification into line with modern requirements. An additional size has been introduced, the poles now being classified as light, medium, heavy, and extra-heavy. Taper poles are no longer recognised as standard, but sectional poles (made in three separate sections swaged together) and one-piece poles (stepped in two parallel sections) are included in the specification, the lengths, outside diameters and minimum thicknesses being specified for each class, the overall length of pole in all classes being 31 ft. Various mechanical tests are provided, and an appendix to the specification gives the approximate weights of poles. No. 52 is the long-awaited revision of the specification for ordinary-size bayonet lampholders for voltages not exceeding 260. Owing to the recent introduction of moulded materials in the construction of lampholders, it was considered by the Committee that until certain research work now in progress was completed, it was preferable to exclude materials from the specification. It therefore deals only with dimensions, these conforming to the international standard as laid down by the International Electrotechnical Commission in so far as interchangeability is concerned. The specification gives standard details of the screw threads, shade-carrier ring, union ring, plungers and terminals, and includes a detailed drawing of a standard lampholder. The dimensions of the ordinary-size bayonet lamp-cap are also given for reference purposes.

A report has recently been published by the B.E.S.A. on Nomenclature for Electrical Equipment for Automobiles and Motor Cycles, which forms divisions 6, 7 and 8 of Report No. 5012, Automobile Nomenclature. This publication covers the details of component parts forming the electrical equipment associated with motor-cars and motor-cycles. Division VI gives the nomenclature for the ignition systems, including wiring, switches, magneto and battery ignition, also a full-size diagram of a sparking plug, together with the nomenclature of some 19 component parts which go to form the complete plug. Division VII covers the component parts of the dynamo, starting motors, and wiring system, also the batteries. Division VIII covers miscellaneous electrical equipment, including lamps and fittings, switchboards, switches, wire and rod controls, electric horns, &c. In the case of Group 3, Wiring of this Division, the terms cable, lead, flexible cord, flexible cable, high-tension cable, and low-tension cable are defined. The report will be found very useful in ordering component parts for electrical fittings, and will be of material assistance in removing any ambiguities which may arise when ordering replacements.

The above publications may be obtained from the Publications Department, British Engineering Standards Association, 28, Victoria Street, London, S.W.1, price 2s. 2d. each, post free.

West Riding Electricity District.

An important meeting has been held in the Council Chamber at the Town Hall, Bradford, to which representatives of local authorities in the West Riding (Aire and Calder) Electricity District were invited. Some 25 townships are concerned, and the authorities have signified their willingness to become members of a conference to be constituted for the purpose of protecting the interests of its members in connection with the supply of electricity, more particularly in connection with any schemes relating to the electricity area of which the existing West Riding (Aire and Calder) Electricity District will form part. All such local authorities are authorised distributors under the Electric Lighting Acts, and a number of them own and operate generating stations. With five exceptions, all the local authorities in question were represented at the meeting. A resolution was passed unanimously that Alderman Wilfred Turner, chairman of the Bradford Corporation Electricity Committee, should be chairman; Alderman D. B. Foster, chairman of the Leeds Corporation Electricity Committee, was appointed vice-chairman, and the Town Clerk of Bradford (Mr. N. L. Fleming) was appointed solicitor and secretary to the Conference. It was decided at the meeting that the Conference should act in a consultative and advisory capacity. It is the successor to and includes the members of a smaller conference which was constituted in 1920, and also actively associated with the preparation of schemes under the Electricity (Supply) Acts affecting the West Riding (Aire and Calder) Electricity District.

Electro-farming in Australia.

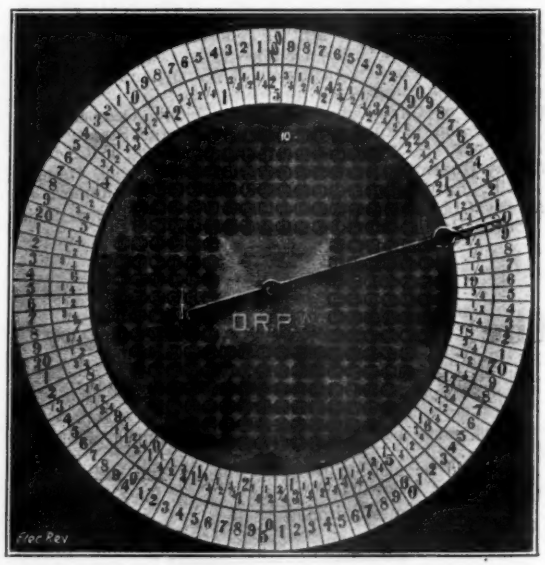
One of the most interesting features of electrical development in Victoria is the electrified farm. In some instances, says the *Melbourne Age*, electrified farms are only made possible by farmers grouping themselves together to secure from the State scheme a supply of electrical energy for lighting and power purposes. The latest addition to the number is a group of seven farmers between Rubicon and Thornton whose properties lie adjacent to the road along which the high-voltage line to Alexandra runs. It has been found possible by the Electricity Commission to make provision for a supply to this group by means of a single step-down sub-station, and a certain amount of low-voltage reticulation, the farmers themselves supplying the necessary service lines. The farmers have also guaranteed a revenue sufficient to provide an adequate return on the service, and the Commission is now preparing to put the necessary work in hand.

Portobello Power Station Extensions.

Mr. Edwin Seddon, engineer and manager of the Edinburgh electricity undertaking, in a recent lecture to the Edinburgh Electrical Society, after referring to the opening of the Portobello station, said the necessity for further extensions would be apparent from the fact that, while the total kWh sold in 1922-23 amounted to 42 millions, the corresponding total for the year to May, 1927, was 80 millions. At present the total capacity of the station was 44,000 kW, with a possible overload capacity of 55,000 kW. Last winter the actual demand on the system rose to 43,200 kW. In July last year an order was placed for two turbo-alternators, with a normal rating of 25,000 kW each and a maximum overload rating of 31,000 kW. The final extension of the station would bring the total plant capacity up to 120,000 kW, with a possible overload to 150,000 kW. Regarding the future of the Portobello station, Mr. Seddon said the programme arranged by the Electricity Board provided for the station turning out 337 million kWh by the year 1930-31, which was nearly three times more than the requirements of the city. The Portobello station would, at that date, be turning out more kWh than any other Scottish station, but after that Glasgow (Dalmarnock) would exceed Portobello. These results would be made possible by two sets of transmission lines between Portobello and the West of Scotland, one line to the north, *via* Dunfermline, and another to the south, *via* Motherwell

An Electrical "Dutch Auction."

In the "Dutch auction" method of selling goods the salesman commences with a high figure and gradually reduces it until a bidder accepts it. The system was originally adopted in the Netherlands to evade a tax imposed by Napoleon upon ordinary auctions. *Commerce Reports* recently described an



A Dutch-auction Dial.

up-to-date Dutch auction system which is in use in the Bremen fresh-fruit market. In the hall the buyers are accommodated in desks, and each has a numbered push-button before him. A large dial (8 ft. in diameter) is situated over the rostrum, and this takes the place of the verbal method. As will be seen from the picture above, the dial is marked from 1 to 100 and from ¼ to 25 in an anti-clockwise direction. In the centre are small numbers corresponding to those on the buyers' push buttons. Immediately a lot is put up the pointer commences to rotate in a clockwise direction, and when it reaches a

price which a buyer is prepared to pay he presses his button. Simultaneously his number on the dial is illuminated and all other push-buttons are disconnected to prevent any dispute As soon as one lot is sold the next lot comes mechanically before the bidders on a conveyor belt, the hand begins to move, and a bid is made.

National Electricity Schemes.

Sir Harry Haward, vice-chairman of the Electricity Commission, delivered an address in Leeds recently on "Local Authorities and the Electricity Acts." The gathering was held under the auspices of the local group of the Institute of Public Administration, the chair being taken by Alderman Wilfrid Turner, chairman of the Bradford Corporation Electricity Committee and of the Conference of Local Authorities for the West Riding Electricity District. He was supported by Sir Charles Wilson, M.P.

Sir Harry Haward's address was of an informative character, says the *Yorkshire Post*, and devoted wholly to a concise history of the laws relating to electricity supply and to an exposition of the general regulations and methods to be pursued under the Electricity Commission's schemes. Incidentally, he mentioned that the total amount of capital which had been expended on municipal schemes of electricity supply in Great Britain had been £139,000,000, of which £125,000,000 had been raised on loan. The net debt now remaining was £77,000,000, so that the large amount of over £48,000,000, 38 per cent. of the original indebtedness, had been discharged. In the year 1925-26 no fewer than 107 undertakings had made profits aggregating £780,000, while only seventeen undertakings had made any demands upon the rates to defray deficits, their aggregate being £18,236, or an average of about £1,000 each.

Sir Charles Wilson appreciated that many of the faults of the new system could not be laid to Sir Harry's charge. Comparisons between the United States and the British municipalities were not fair comparisons, for in America they were allowed to go ahead. The new system seemed to have been founded upon great expectations from the grid system of distribution, but the railways had already found that the cost of that system was so great that they could not carry it out. It seemed that the proposal was to annex the profits made by the large and efficient works in order to distribute them to the inefficiently supplied districts.

Mr. C. N. Hefford, Leeds City electricity engineer, in moving a vote of thanks to Sir H. Haward, complained of the restrictions which had of late years been placed upon electrical engineers. Now they were asked to adapt themselves to prospects more vast than they were quite able to conceive. The attitudes of the past and present were as different as the two poles.

Mr. T. Roles, Bradford City electricity engineer, seconding the resolution, complained that while some of the Yorkshire municipal systems had had to bear for themselves the cost of changing their frequency from 25 to 50 cycles, it was proposed that Glasgow, Birmingham, and the North-East Coast, which had retained 25 cycles, should be changed to 50 at the expense of the Board, and the cost spread over the other districts.

Waste Heat at Burnley.

Burnley Rotarians were addressed recently by Mr. G. S. Francis, of the British Electrical Development Association. Rotarian Herbert Clegg (Burnley's gas engineer) did not think any expected reduction in cost of distribution would be sufficient to displace steam power. At the Burnley gas works they were expecting, by the exploitation of waste heat, to produce electricity at a price no electric power station could attain. The utilisation of waste heat might not supply the whole electrical needs of the country, but it would go a long way towards doing so.

Colliery Electrification.

The new all-electric Thoresby colliery, belonging to the Bolsover Colliery Co., was recently inspected by members of the Association of Colliery Electrical Engineers (Nottingham Section). The sinking is now about 320 yd. deep, and it is expected that coal will be struck at between 550 and 650 yd. depth. Mr. A. Lucas, district manager of the British Thomson Houston Co., contractors for the electrical plant, said the colliery used no boilers, made no steam and no smoke; it was being supplied with electrical energy produced at Bolsover, Creswell, Crown Farm Colliery, Rufford and Clipstone, mainly from the exhaust steam from those collieries, and transmitted by overhead cables to Thoresby at a pressure of 22,000 volts. Safety was provided for by a duplicate supply, which was transformed down to suit the requirements of the plant. Automatic control, locking, and electrical safety devices had been introduced to ensure the greatest possible safety.

Self-contained Cooking Utensils.

In connection with the article by Dr. S. Parker Smith on his experience with an all-electric house, which appears elsewhere in this issue, we understand that the author received valuable assistance from Mr. Duncan Low, of Messrs. Archibald Low and Sons, Ltd., Glasgow, in the development of the special self-contained cooking utensils which form an important part of the cooking equipment, together with the fittings on the cookers which are provided for use with them. As the manufacture of these devices, which necessarily cost more than the customary patterns, offers little prospect of reward from a commercial point of view, Mr. Low's collaboration with Dr. Parker Smith must be regarded as a sporting contribution to the advancement of domestic electrification, for which due credit should be awarded to him and his firm.

Irish Electricity Supply Association.

The report which was read by Mr. L. J. Kettle, Dublin, hon. secretary of the Irish Electricity Supply Association, at the annual meeting, held in Limerick last week, reviewed somewhat in detail the events of the past year, giving an outline of the objects and powers of the Central Electricity Board formed under the Free State Electricity Supply Act. He stated that during the year seven members had joined the Association. No new electricity works had been started, but, notwithstanding the condition of general depression and the atmosphere of uncertainty, progress had been made, especially in the field of domestic electricity supply, by many of the established undertakings.

Mr. Wm. Hewat, Dublin, who presided, observed, in moving the adoption of the report, that the Shannon scheme controversy had closed, but he felt obliged to say with respect to the measure relating to distribution which the Free State Government had passed this year that it was an iniquitous measure for any Government to put forward. They, as representing the electrical industry of the State, might, in the whole matter of the Shannon scheme, have been asked to co-operate with the Government, but they, as an Association, had been treated as pariahs. Under the latest Act all their undertakings could be put out of existence. He did not think that was the intention, but the newly-created Electricity Board had been given considerable powers. He wished, however, to offer to the Board any service that the Association could render, or that could be rendered by members individually, for they all recognised now that the scheme was a national one, and, as such, called for their support.

Mr. Kettle commended to the notice of the members the programme of the Electrical Development Association as being useful in propaganda work for the increase, not only of the number of consumers, but also of the amount of electricity consumed by each. The officers and Council were re-elected for the coming year, the president being Mr. William Hewat.

At the annual dinner of the Association, which followed the meeting, Dr. P. W. Sothmann, Government Electrical Adviser on the Shannon scheme, said that national hydro-electric schemes had been a success everywhere else, and it would be a shame if it was allowed to fail in Ireland. The Shannon works were equipped with every modern improvement proved up to the last couple of months. Its success would be the glue that would solidify into the unity of North and South in Ireland.

Mr. W. A. Ryan, Kerry, said he had been doubtful about the success of ranch electrification until a recent visit to Chester, where he saw a rural electrification plant working successfully.

Lightning Conductors.

In a paper on "Lightning Conductors, Steeplejacks and Their Work," by Mr. G. A. Collier, engineer and manager of the lightning conductor and steeplejacks department of Messrs. W. J. Furse & Co., Ltd., given before the Nottingham Society of Engineers, some interesting information concerning the construction and functioning of lightning conductors is given. An efficient lightning conductor has to function in two ways—as a preventative and as a protective. If a building be fitted with sufficient lightning conductor points, the induced earth current will be provided with a path of escape, as a continuous brush discharge from the points. The continuous brush discharge from the points is not usually audible, and is termed "the silent discharge," although, if rapid, it can be heard as a crackling noise. As to its protective capacity, the brush discharge from the points may be insufficient to prevent a disruptive discharge, the brush action having prepared the way for this. In this event, providing the conductor system be efficient, the discharge, owing to brush action, would be greatly modified and pass to earth, through the excellent path provided for it, without damage or trace. If the disruptive charge be very sudden, the protective action results solely from its affording a better discharge path as an alternative to the building on which it is fixed, owing to its lower impedance and direct course. Inductance is an important consideration in designing and fixing lightning conductors, for where a conductor is fixed, passes, or is adjacent to an independent mass of metal, such as a lead roof, in the event of the conductor functioning, induced electricity may be produced in these masses of metal, and a sufficient pressure created to cause a disruptive flash between the metal and the conductor, or any gas or water pipes, that may be in close proximity. The components of a simple conductor, air terminal, tape, holdfasts and earth connection, the selection of which should depend on the class of building to be protected, are all dealt with. The importance of an efficient earth connection is stressed, and suggestions to that end are made. Many interesting examples of conductor installations are given, and some cases are cited to disprove the fallacy that a lightning conductor is capable of receiving a discharge and transmitting it to earth. Messrs. Furse will be pleased to send any responsible interested reader a copy of the paper on application to their head office, Traffic Street, Nottingham.

Public Service Engineering.

"Engineering in the Public Services of the City" was the title of the presidential address delivered by Mr. W. E. Swale, A.M.I.E.E., to the members of the Stoke-on-Trent Association of Engineers recently. He reviewed in detail the engineering problems connected with the work of four departments of the Corporation—surveyor's, sewage, gas, and electricity. In referring to the electricity department, Mr. Swale mentioned that it had 8,911 consumers. The units generated last year amounted to 22,142,000, and the average coal consumption was 2.55 lb. per kWh.

Appointments Vacant.

Two junior mains assistants for the Ayrshire Electricity Board. Junior technical officer for the Admiralty Experimental Establishment. Electric cooking demonstrator and showroom assistant (£150) for the Borough of Newport (Mon.) Electricity Department. Telephone engineer (£E800) for the Egyptian State Railways, Telegraphs and Telephones Department. Meter repairer for the Loughborough Corporation Electricity Department. Canvasser (£3) for the Borough of Wrexham Electricity Department. (See our advertisement pages to-day.)

The Faraday Memorial.

Michael Faraday, in the words of Sir Oliver Lodge, initiated a whole new profession—electrical engineering. His discoveries in the sphere of chemistry also were the foundation of the world's great chemical industrial undertakings of to-day. He was born in Southwark, the son of a blacksmith whose forge stood near the present Southwark Town Hall and Central Reference Library. As previously announced in our pages, it is the purpose of the Southwark Borough Council to establish a Faraday Memorial Collection in the Central Reference Library, consisting of the biographies, portraits, and published works of Faraday, and the best and latest books on the sciences and their applications, particularly electricity, with which Faraday's name is identified. This it is proposed to do by means of a Faraday Memorial Fund, the annual income from which will be expended year by year under the direction of a special committee exclusively for the purpose in view. In this way the memorial will have permanent vitality, perennial freshness, and ever-increasing usefulness.

The use of the Faraday Memorial Collection will not be limited to local residents, but, like the benefits of Faraday's discoveries, will be available for all who wish to enjoy it. The scheme is meeting with wide and cordial approval, among its supporters being the Royal Society, the Royal Institution of Great Britain, the Institution of Electrical Engineers, the Institution of Civil Engineers, the Faraday Society, Society of Chemical Industry, National Benzole Association, the British Electrical and Allied Manufacturers' Association, and many other bodies at home and overseas.

The memorial is to be inaugurated by Sir Oliver Lodge on October 28th. Among our readers may be some who would like to be associated with the Council in this work, especially such as are engaged in the industries based on Faraday's labours, or who admire Faraday for his high personal character. Contributors, without regard to the amount of the contribution, will be enrolled as Foundation Donors.

Association of Supervising Electrical Engineers.

On October 4th, Mr. A. M. Sillar, M.Inst.C.E., read his presidential address, taking for his subject the training of an electrical engineer; he pointed out that nowadays, whilst training in practical work was absolutely essential, without a scientific or theoretical backing it would tie a man down to very narrow limits. If means were not available for payment of college fees, a youth should have a thorough grounding in the shops of a manufacturing concern; apprenticeship under proper conditions was the only satisfactory method of entering the practical side of the electrical industry. Since the war the skill of the average man had dropped to a lower level, and if electrical installation work was to be continued as a skilled trade the newcomers into it must be carefully trained. The Electrical Contractors' Association had standardised a system of five years' apprenticeship under indentures, but without premium, but apparently it had not been widely accepted. Skill in the use of tools must be acquired in youth, and a firm ought to provide sufficiently wide experience to enable its apprentices to become skilled over a reasonable range. The learner would never be a really capable mechanic unless he also acquired a knowledge of the forces he was dealing with, and excellent evening classes were now available for that purpose. Mr. Sillar in 1893 started the first class in manual work for wiremen that was held in this country, at the request of the Shoreditch Vestry, and later conducted similar classes at the Battersea Polytechnic. Regular courses were now provided by the education authorities covering a wide range of theoretical and practical work, and examinations were held by the City and Guilds. It was much to expect of a youngster to spend two or three evenings a week on additional work, but few of them would have obtained the positions which entitled them to membership of the Association if they had not done as much or more. Those who meant to succeed would have to spend much of their spare time at work not only in early but also in later years. He would like to see the practice of giving the apprentice one or two afternoons off per week to amplify evening study widely extended. Messrs. Marryat & Place were developing a scheme under which a selected proportion of their apprentices were given two months on practical work alternating with one month on a whole day course at a technical institute; during the latter period their fees were paid but they received no wages. This was a novelty, and Mr. Sillar hoped it would be so successful as to warrant wide adoption. Evening training should not cease when an apprentice became a journeyman. Every capable mechanic ought to be able to produce a dimensioned hand sketch, and to express himself intelligently and clearly on paper. When an engineer ceased to learn, he also ceased to be an engineer, whatever his age. Electricity now covered an immense scope; no one could keep in touch with all its branches, but they should follow all new developments in their own branch. Their position, as supervisors, enabled them to exercise the greatest influence on the progress of apprentices.

Central Electricity Board.

The Central Electricity Board has appointed Sir Reginald Blomfield, M.A., R.A., to advise it on questions arising in connection with the design and colouring of the towers for carrying transmission lines. According to *The Times*, the towers are to be made as artistically pleasing as possible. The Central Electricity Board believes that the towers may be constructed with graceful proportions and well-balanced lines, so as to be attractive to the eye. They will probably be of different colours in different districts, to tone with their backgrounds. Hundreds of designs have been considered by the Board, and a model tower is in existence, built on the scale of a 16-foot square base with a height of 80 ft.

A New Heat Insulation.

In a paper which was to be read before the Institute of Marine Engineers, "A New Form of Insulation for High Temperatures," by Mr. F. C. Timpson, M.B.E., some particulars are given of "glass silk," a new material which has been produced to withstand the very high temperatures found with superheated steam and Diesel engine work. The term "glass silk" has been applied to differentiate the material from "glass wool." It is an exceedingly fine form of drawn glass, and is produced, at present, in Germany. The method is briefly as follows:—The glass is brought to a molten state in a gas-fired furnace, the bottom of which is perforated. Drops of molten glass are allowed to fall on to a revolving drum or drums. The glass beads strike the surface of the drum and are drawn out into a very fine fibre. When the glass fibre has accumulated on the drum to a sufficient depth it is cut spirally and the resulting product is a series of glass fibres equal in length to the circumference of the drum. This material constitutes loose "glass silk," and it is often utilised in this form for insulating purposes. It is usually applied in this form by making a close mesh wire netting sleeve of sufficiently greater diameter than the pipe or cylinder to be insulated, and packing the loose material into this sleeve. The outer surface is afterwards treated with a hard setting composition to protect the insulation and to give a finished appearance to the work. Loose "glass silk" can be made up into a number of forms for convenience in handling and applying. "Glass silk" felt is made up in rolls about 8 ft. long by 20 in. wide by 13/16ths in. thick, and can be applied much in the same manner as ordinary felt. "Glass silk" strip is made up in lengths 8 ft. long by 4 in. wide by 13/16ths in. thick, and can be produced with a fireproof paper covering or stitched on to a jute or asbestos cloth backing. The strip is wound round the pipe to be insulated, additional lengths being secured by wire staples to the ends of the preceding strips until sufficient material has been applied. In this form the insulation is usually reinforced by applying a gauze wire bandage to the outer surface, this bandage being wound in the opposite direction to that in which the strip has been wound, and again giving the outside a surface of composition to finish off. Various forms of "glass silk" mattresses are also made, those for temperatures up to 500 deg. F. or thereabouts being covered with asbestos cloth, and those for higher temperatures being covered with wire netting. Tests on the thermal conductivity of "glass silk" have been carried out by the National Physical Laboratory. The following figures relate to a sample measuring 9 in. by 14 in. by 2 in. The table gives the thermal conductivity of the sample expressed in two sets of units for a hot face temperature of 100 deg. C. and 300 deg. C., and a cold face temperature of about 20 deg. C.

Hot face temperature.		Gram Calories per square cm. per sec. for 1 cm. thickness and for 1° C. difference in temperature.	B.th.u per sq. ft. per hour for 1 inch thickness and for 1° F. difference in temperature.
C	°F		
100	212	0.000099	0.287
300	572	0.000122	0.354

Electricity in Laundries.

The Manchester and District Co-operative Laundries Association opened its fourth laundry recently at Eccles. Its plant includes six direct electric motor-driven extractors, electrically-driven presses, and other plant by Messrs. James Armstrong and Co., Ltd. The electrical equipment of the laundry has been carried out by Messrs. R. Seddon & Sons, of Manchester. Electricity is obtained from the Eccles Corporation Electrical Department, entering at 6,600 volts, and is transformed by a 3-phase transformer to the required voltage.

Institution Notes.

Institution of Electrical Engineers.

TEES-SIDE SUB-CENTRE.—*Chairman's Address.*—In the course of his inaugural address, on October 5th, Mr. S. G. Marston, general manager and engineer of the Stockton Corporation electricity undertaking, said that concentration of generating would undoubtedly result in a low cost per kWh at the stations, but it was the ultimate cost to the consumer, particularly to the private householder, which was really important. The modern scheme of laying out housing estates, with houses detached and semi-detached, and placed back from the road, had increased the capital cost of distribution to a material degree. Comparative returns showed that the average cost per kWh for household lighting alone was 4½d. In similar houses where electric cookers were in use the consumption was much higher, but the cost per kWh was only 1½d. at the domestic rate. From the station standpoint cookers were the ideal means of securing a greater use of electricity, for they were rarely in use during the peak-load hours. He advocated additional expenditure from revenue upon cookers and other apparatus for hire.

SCOTTISH CENTRE.—In his inaugural address, Mr. D. M. Macleod, chairman, spoke on "Public Electricity Supply." The problem before the Electricity Commissioners he described as one of great difficulty and responsibility; it was one thing to envisage the path of progress and development and another and more difficult matter to reconcile the conflicting interests of supply authorities which had expended large sums of money on their own schemes and created financial burdens of considerable magnitude. The proposal to use a working pressure of 132,000 volts for the main transmission lines was a radical departure from existing practice in this country. Had not the time come, he asked, when the Commissioners might approve typical constructional plans for transmission lines up to, say, 33,000 volts? This would save the time of undertakers in waiting consideration and approval of every line notified, a procedure which could only be justified if the methods of construction were novel or unfamiliar. Mr. Macleod put in a plea for the fuller utilisation of Scottish water power. The Board alone had the requisite authority to build transmission lines, irrespective of geographical boundaries, and to extend supplies to districts hitherto out of reach; the erection of a national system of transmission lines would materially alter the conditions in favour of water power.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Sir W. J. LARKE, K.B.E., has been appointed a member of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research.

Mr. E. J. CHAMBERS, J.P., of Dudley, who was, until his retirement in 1904, managing director of Bullers, Ltd., electrical engineers, of Tipton, has celebrated his diamond wedding. He remained a director of the firm until his resignation last January.

The Aldershot Town Council has increased the salary of the borough electrical engineer, Mr. GARSIDE, from £571 to £600 per annum as from January 1st last, and will not pay a salary in accordance with the award of the Associated Municipal Electrical Engineers.

Mr. M. C. TIMMS, who is well known in extra-high-pressure cable circles, has this week joined the staff of the Yorkshire Electric Power Co. at Leeds. His colleagues at Messrs. Siemens Bros., Woolwich, with whom he has worked for 28 years, presented him with a handsome gold watch, suitably inscribed, as a mark of the high esteem in which they hold him.

The Bournemouth Town Council has appointed Mr. E. B. BAXTER, divisional manager at Hastings of the Maidstone and District Motor Service, as traffic superintendent of the tramways at £350 per annum.

Mr. H. HARRIS, of the Helsby works of British Insulated Cables, Ltd., was, on Thursday last week, presented by Mr. W. Whiteley, deputy works manager, with a gold watch. Mr. Harris has joined the staff of the company's Calcutta agency.

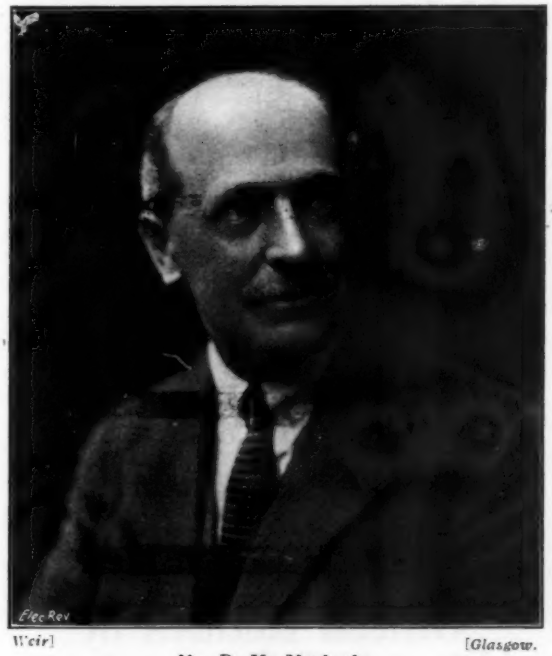
Mr. JAMES N. WAITE, chief assistant electrical engineer to Stoke-on-Trent Corporation, was, on October 14th, appointed as deputy city electrical engineer for Bradford, in succession to Mr. JAMES TOWNEND, who has joined the staff of the London County Council. There were 90 applicants for the post at Bradford, which carries a salary of £800 per year, rising to £1,000. Mr. Waite, who takes up duty at Bradford on December 1st, was with the Newcastle-on-Tyne Electric Supply Co. before going to Stoke.

The Kendal Town Council has appointed Mr. J. EDWIN STORR as engineer for the proposed extensions to the electricity works, the maximum amount for fees, including the duties of resident engineer and clerk of works, travelling and all expenses, not to exceed £900, plus the cost of the preliminary report.

The salary of Mr. S. PARSONS, tramway manager, Ramsbottom, has been increased to £240, plus bonus, making a total of £348.

On the occasion of his marriage to Miss WINIFRED PENROSE, of Falmouth, Mr. CHARLES EDGAR BENNETTS (engineer to the Ross-shire Electric Supply Co., of Dingwall) has been presented with some electrical apparatus by the staff and officials of the company.

Mr. D. MACFARLANE MACLEOD, the new chairman of the Scottish Centre of the Institution of Electrical Engineers, who delivered his inaugural address at Glasgow on October 11th, is the chief engineer to the Clyde Valley Electrical Power Company. He served his apprenticeship with the Faraday Electrical Engineering Co., Ltd., and Messrs. J. & G. Harvey, machine tool makers, of Govan, Glasgow. He received his technical training at the Glasgow and West of Scotland Technical College, and served for some time as junior assistant with the late Professor Andrew Jamieson. Mr. Macleod has served successively on the staffs of the Edinburgh Corporation as switchboard attendant and the Aberdeen Corporation, first



Weir] [*Glasgow.*

Mr. D. M. Macleod,
Chairman of the Scottish Centre of the I.E.E.

as charge engineer and latterly as deputy city electrical engineer. In 1899 he became mains engineer for the Poplar Borough Electricity Department, and three years later was made assistant borough engineer with full control both on the generating and distributing side. In 1905 he joined the staff of the British Westinghouse Co., and supervised in their interest the laying of the greater part of the distributing system for their Clyde Valley contract. In 1907 he was taken over on to the Clyde Valley Company's staff, upon which he has served successively as mains engineer, resident engineer, and, as already stated, as chief engineer, which position he now holds.

Mr. W. H. FELLOWS, electrical engineer to the South Staffs. Waterworks Company, is the new president of the Warwickshire and South Staffordshire Branch of the Association of Mining Electrical Engineers. He was recently installed at a meeting at Lichfield, succeeding Mr. J. R. ENGLISH, electrical engineer to the Walsall Wood Collieries.

Obituary.—MR. L. FARMER.—Mr. Leopold Farmer, of Leopold Farmer & Sons, the London auctioneers and estate agents, whose reports upon the course of factory letting have been frequently quoted from in our pages, passed away on October 13th, at the age of 85 years.

MR. W. J. GREENFIELD.—The death took place, on October 5th, at the age of 60 years, of Mr. Walter James Greenfield, electrical engineer, of Market Deeping, Lincs.

M. H. VOGT.—The death is reported from Nancy, France, at the age of 64 years, of M. Henri Vogt, the director of the Institut Electrotechnique et de Mécanique in that town.

Financial Section.

New Companies, Returns of Share Capital, Debenture Changes, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

Brolt, Ltd.—Private company. Registered October 10th. Capital, £100 in £1 shares. Objects:—To carry on the business of manufacturers of, and dealers in all kinds of fittings for electrical wiring and all kinds of apparatus, articles and accessories used or capable of being used in connection with the erection and fitting up of electrical or other specialised installations, &c. The first directors are:—H. J. Sayer, "Beechcroft," Belle Walk, Moseley, Birmingham; P. F. B. Bennett, "Ardencote," Luttrell Road, Four Oaks, Sutton Coldfield; O. Lucas, 15, Westbourne Road, Edgbaston, Birmingham (all directors of Joseph Lucas, Ltd.). Registered office: Well Street, Birmingham.

E. I. C. Magnetos, Ltd.—Private company. Registered October 10th. Capital, £100 in £1 shares. Objects:—To carry on the business of magneto manufacturers, manufacturers of appliances of all kinds, whether electrical or otherwise, for ignition or starting in connection with internal-combustion engines, &c. The first directors are:—H. J. Sayer, "Beechcroft," Belle Walk, Moseley, Birmingham; P. F. B. Pennett, "Ardencote," Luttrell Road, Four Oaks, Sutton Coldfield; O. Lucas, 15, Westbourne Road, Edgsbaston, Birmingham (all directors of Joseph Lucas, Ltd.). Registered office: Well Street, Birmingham.

Kelly & Shiel, Ltd.—Private company. Registered in Dublin October 10th. Capital, £200 in 100 ordinary and 100 7 per cent. preference shares of £1 each. Objects: To enter into an agreement with J. K. Maconchy and G. T. Kelly, trading as "Kelly & Company," and to carry on the business of dealers in wireless telegraphy and telephony, &c. The subscribers (each with one share) are:—J. K. Maconchy, 115, Grafton Street, Dublin, civil engineer; A. O. Shiel, 47, Fleet Street, Dublin, radio engineer; G. T. Kelly, 47, Fleet Street, Dublin, radio engineer. Secretary, A. O. D. Shiel.

W. C. Martin & Co., Ltd.—Private company. Registered in Edinburgh, October 10th. Capital, £6,000 in £1 shares. Objects: To carry on the businesses of electricians, contractors, heating and mechanical engineers, brass founders, metal workers, &c. The first directors are:—J. Lowson, 12, Campbell Street, Glasgow, electrical engineer; J. K. Barclay, 125, West Regent Street, Glasgow, writer. Qualification: 10 shares. Registered office: 12, West Campbell Street, Glasgow.

Official Returns of Electrical Companies.

Vickers, Ltd.—Capital, £26,500,000 in 54,000,000 ordinary shares of 6s. 8d. each, 7,000,000 cum. preference and 750,000 5 per cent. preference shares of £1 each, and £750,000 preferred 5 per cent. stock. Return dated May 13th, 1927. 12,315,483 ordinary, 6,863,807 cum. preference, and 750,000 5 per cent. preference shares, and £750,000 preferred 5 per cent. stock taken up. £4,520,673 6s. 8d. paid on 6,544,621 ordinary and 2,284,133 preference shares, and £55,000 preferred stock. £7,948,294 13s. 4d. considered as paid on 5,770,862 ordinary, 4,579,674 cum. preference, and 750,000 5 per cent. preferred shares, and £695,000 stock. Mortgages and charges: £1,250,000 5 per cent. first mortgage stock; £2,000,000 5½ per cent. first mortgage debenture stock, and £58,352 19s. 3d. Houses and land at Barrow.

Payne & Hornsby, Ltd.—Capital, £5,000 in £1 shares. Return dated April 28th, 1927. All shares taken up. £5,000 considered as paid. Mortgages and charges, nil.

Standard Electric Co., Ltd.—Capital, £10,000 in 5,000 preference and 5,000 ordinary shares of £1 each. Return dated June 17th, 1927. 3,077 preference and 5,000 ordinary shares taken up. £4,377 paid, £3,700 considered as paid. Mortgages and charges: £300.

Hooper's Telegraph and India-Rubber Works, Ltd.—Capital, £50,000 in 1,000 preference and 4 000 ordinary shares of £10 each. Return dated July 12th, 1927. All shares taken up. £40,000 paid on 4,000 ordinary shares, £10,000 considered as paid on 1,000 preference shares. Mortgages and charges, nil.

Yeovil Electric Light and Power Co., Ltd.—Capital, £50,000 in £1 shares. Return dated May 23rd, 1927. 41,500 shares taken up. £41,500 paid. Mortgages and charges, nil.

John Adams, Ltd.—Capital, £7,000 in 6,000 preference and 1,000 ordinary shares of £1 each. Return dated May 13th, 1927. 2,000 preference and 300 ordinary shares taken up. £2,300 paid. Mortgages and charges, nil.

Mid-Cheshire Electricity Supply Co., Ltd.—Capital, £150,000 in 68,775 ordinary, 60,525 7 per cent. cum. preference, 10,000 5 per cent. preference, and 10,700 unclassified shares of £1 each. Return dated April 8th, 1927. 68,775 ordinary, 60,525 7 per cent. preference, and 10,000 5 per cent. preference shares taken up. £138,600 5s. paid, £500 considered as paid, £199 15s. in arrears. Mortgages and charges: £29,060 6 per cent. mortgage debentures.

Imperial Tramways Co., Ltd.—Capital, £400,000 in 20,000 preference and 20,000 ordinary shares of £10 each. Return dated April 2nd, 1927. All shares taken up. £100,000 paid, £300,000 considered as paid. Mortgages and charges: £300,000.

Bretwood, Ltd. (formerly Radio Improvements, Ltd.).—Particulars filed of £1,000 debentures authorised August 24th, 1927, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £400.

Wireless Piano Players, Ltd.—Issue on September 26th, 1927, of £1,000 debentures, part of a series already registered.

Shoreham and District Electric Lighting and Power Co., Ltd.—Issue on September 30th, 1927, of £1,000 debentures, part of a series already registered.

Hindhead and District Electric Light Co., Ltd.—Issue on September 29th, 1927, of £50 debentures, part of a series already registered.

W. H. A. Robertson & Co., Ltd.—Satisfaction to the extent of £300 on March 25th, 1927, of mortgage dated June 17th, 1926, securing £1,200. (Notice filed October 4th.)

Pritchett & Gold and E.P.S. Co., Ltd.—Satisfaction in full on September 29th, 1927, of charge dated September 29th, 1926, securing £18,000.

Romford Electrical Radio, Ltd.—M. J. Wilson, of 50, Doughty Street, John Street, W.C.1, was appointed receiver and manager on October 4th, 1927, under powers contained in debenture dated April 4th, 1925.

Radio Service (London), Ltd.—Satisfaction in full on September 15th, of debenture dated July 25th, 1927, securing £125.

Ashton Electrical Company (Preston), Ltd.—Mortgage dated September 30th, 1927, to secure £300, charged on 8, Tulketh Brow, Ashton-on-Ribble. Holder: R. Hall, "Meadow Side," 289, Watling Street Road, Fulwood, near Preston. Also second mortgage charged on the above-mentioned premises, dated October 1st, 1927, to secure £200. Holders: Miss M. Sudell, Lever House, Leyland, near Preston, and others.

City Notes.

Agricultural and General Engineers, Ltd.

In his speech at the annual meeting last week, the chairman (Mr. G. E. Rowland) said that having regard to the adverse conditions of the year the results might be considered satisfactory. Dealing with the constituents of the group he said that Garrett's reported the receipt of very satisfactory orders. An order was in hand for 40 electric vehicles for the Glasgow Corporation. Their trolley 'buses had proved popular and it was claimed that over 50 per cent. of the trolley 'buses in use to-day were of Garrett's manufacture. The sales of Blackstone's oil engines were increasing and a vertical heavy oil engine placed on the market by Davey Paxman's had been well received. The sales of "Bull" motors continued to expand very satisfactorily. The A.G.E. had done a good deal of development work in Argentina and good results were expected, and similar methods had been adopted for South Africa and India; it was hoped to extend to Australia and other leading Dominions.

Drake & Gorham, Ltd.

The net profit for the year ended June 30th last was £9,586, as compared with £8,920 for 1925-26. To this is added £1,856 brought forward, making £11,442. It is proposed to pay a dividend of 5 per cent. (as last year) and to place £2,500 to general reserve, leaving £2,692 to be carried forward. The report states that the value of the orders in hand at the

end of the year was considerably in excess of the previous year's figure. An important contract in connection with the new Bank of England, which will be spread over a term of years, is among the orders in hand. Meeting: October 25th.

Companies Struck off the Register.

The names of the undermentioned companies have been struck off the Register and they are thereby dissolved:—

Astro Electric, Ltd.
Beaver Electrical Supply Co., Ltd.
Delta Electrical and General Engineering Co., Ltd.
Eclat Electrical Manufacturing Co., Ltd.
Electric Hammers, Ltd.
Electric Tools & Motors, Ltd.
Hill's Wireless Stores, Ltd.
National Radio Corporation, Ltd.
Radio-Constructa, Ltd.
St. Mark's Electrical Co., Ltd.

Ferranti, Ltd.

The directors' report for the year ended June 30th last records a net profit of £35,982, after providing for debenture interest, depreciation, taxation, &c. To this is added £20,000 from the taxation reserve and £36,558 brought forward, making £92,540. The preference dividends absorb £9,520, £35,000 is transferred to general reserve (making £235,000), and it is proposed to pay a dividend of 20 per cent., free of tax, on the ordinary shares, leaving £36,020 to be carried forward. Considerable extensions of buildings and plant have been made during the year to provide for the demands of the business. The meeting was to be held yesterday (Thursday).

Electrolytic Zinc Co. of Australasia.

The report for the year ended June 30th last shows that after placing £145,000 to depreciation reserve the gross profit was £390,077 (against £420,699), and to this is added £182,686 brought forward, making £572,763. From this £12,100 is transferred to debenture sinking fund reserve, £20,000 is written off research and development account, £40,000 is placed against the cost of new plant, and dividends absorb £312,000, leaving £188,663 to be carried forward. The company proposes to commence the erection next year of a mill capable of dealing with 100,000 tons of ore annually.

Northampton Electric Light and Power Co., Ltd.

The directors are offering to shareholders upon the register on September 13th, 69,767 ordinary "B" shares of £1 each at the price of 26s. per share. The shares will carry the right to a dividend for the period from November 1st to December 31st at the rate of 9 per cent. on the amounts (not including the premium) paid up on the shares upon acceptance. After December 31st they will rank *pari passu* with the existing ordinary shares in all respects. The offer remains open until November 1st.

Parker, Winder & Achurch, Ltd.

The nominal capital of the company is being increased to £120,000 by the creation of 60,000 £1 ordinary shares. It is proposed to issue 43,000 of the new shares immediately; 38,000 will be offered to present shareholders at 22s. per share and 5,000 will be reserved for issue to the staff on special terms.

Stock Exchange Notice.

Application has been made to the Committee to allow the following to be officially quoted:—

West London and Provincial Electric and General Trust, Ltd.—£150,000 ordinary stock.

Callender's Cable and Construction Co., Ltd.

An interim ordinary dividend of 1s. per share has been declared. This is the usual rate, but is paid on capital increased last year by 33⅓ per cent.

Anglo-American Telegraph Co., Ltd.

An interim dividend of 15s. per cent. has been declared on the ordinary stock for the quarter ended September 30th, and one of 30s. per cent. on the preferred stock.

Brampton Bros., Ltd.

The report for the past year shows a net profit of £10,614, to which is added £13,305 brought forward. An ordinary dividend of 7½ per cent. is recommended.

Babcock & Wilcox, Ltd.

The directors have raised the interim dividend from 5 per cent. to 7 per cent., free of tax. Last year's total dividend was 13 per cent., free of tax.

Indo-European Telegraph Co., Ltd.

An interim dividend at the rate of 5 per cent. per annum, free of tax, has been declared for the half-year ended June 30th.

Erinoid, Ltd.

A final dividend of 4 per cent. is recommended, making 7 per cent. for the year, as against 10 per cent. for 1925-26.

Brazilian Traction, Light and Power Co., Ltd.

A quarterly dividend of 1½ per cent. has been declared on the issued ordinary capital.

German Companies.

The *Electric Light and Power Investments Co.*, Berlin, reports a further improvement in the position of the supply undertakings in which it is interested. The net profits earned in 1926-27 amounted to 1,940,000 marks, as compared with 1,460,000 marks in the preceding year, and the dividend is again at the rate of 10 per cent.

The *Rheydt Cable Works Co.* reports a net surplus of 977,000 marks for 1926-27, as against 1,010,000 marks in the previous year, the rate of dividend, as recently mentioned, remaining at 12 per cent. All departments, the report says, were sufficiently employed last year, and the demand has not diminished.

French Companies.

The *Société Le Fil Dynamo*, Lyons, proposes to increase its dividend from 25 fr. per share in 1925-26 to 30 fr. for the past year.

The *Société d'Electro-Métallurgie de Dives* records net profits of 18,594,000 fr. for 1926-27, as compared with 15,176,000 fr. in the preceding year. It is proposed to pay a dividend of 115 fr. per share (23 per cent.) as in 1925-26.

United River Plate Telephone Co., Ltd.

An interim dividend of 3 per cent., free of tax, has been declared on the ordinary shares, as in 1926.

Stocks and Shares.

MONDAY EVENING.

THE Stock Exchange is a busy place these days. Some firms are doing more trade than they have ever handled before. The Mid-October settlement, which finished last week, proved to be of record dimensions in some of the markets. Industrials absorb the greater part of the public's attention, but there are clear indications of a spread of interest. The gilt-edged stocks stand up remarkably well, and the selling of these, by people who have decided to embark upon more speculative issues, is countered by extensive demand from purely investment quarters. Side by side with this activity in Stock Exchange markets there is proceeding a recovery in certain trades, evidence of which is provided by the Babcock & Wilcox Company, which has raised its interim dividend by 2 per cent., to 7 per cent. actual. The price of the shares has gone up 3s. to 59s. 3d. The company paid 13 per cent. for the whole of last year, and expectation puts 14 per cent. as a conservative estimate of what the current year's working is likely to afford. It should be observed that the raising of the dividend is explainable in part by the Board's desire to make the two half-yearly payments more equal.

Manufacturing Companies.

In the group of manufacturing companies' shares the steady advance of prices continues. Henley's stand out as the most prominent of the features, the price being 7s. 6d. up at 5⅞. Callender's have gained 3/16 at 3 13/16. Brush shares again are better, at 28s. 9d. Edison 5 per cent. debenture put on a couple of points with a rise to 90, stock changing hands recently at 89½. The company's 5½ per cent. debenture is quoted 79 to 83, ex the interest recently paid, and a bargain was marked last Friday at 24s. 9d. in the first preference shares. British Insulated ordinary have gone up to 76s. 3d. On the other hand, British Aluminiums show a decline at 44s. 6d. Telephone Manufacturing shares are rather unaccountably heavy at 6s. 7½d., a price that may attract notice from buyers of speculative industrials as looking attractive.

Provincial Electric Supply.

With shares in the London electricity list quiet and unchanged on the week, the firmness of the provincial descriptions becomes the more marked. Midland Counties, after a long period of quiescence, are mounting in favour and in price, the latter now being up to 23s. Lancashire Light and Power are better at 29s. North Wales Power have come to the front with a burst of strength at 12s. Northampton Electric "B" ordinary improved to 31s. on the announcement that the remaining 69,700 ordinary are to be offered at 26s. to the present proprietors of the ordinary and preference shares. The new shares will rank for a dividend at the rate of 9 per cent. for two months, becoming *pari passu* with the existing ordinary after December 31st next. Business in electric lighting and power, traction and tramway issues, home and foreign, runs to-day upon a scale of continually-broadening activity.

Foreign Traction.

Brazilian Tractions refused to be kept down for long, and, after their slight reaction of a week ago, have developed further robustness with a 4-points rise. Sympathetically, the preferred advanced to 177. The Anglo-Argentine Tramways group is better, although the only quotable change is a rise of ¼, to 3 9/16, in the second preference. This makes the price 1/16 higher than that of the first preference, which carry 5½ per cent. dividend, against the 6 per cent. paid on the seconds. British Columbia Electric Railway stocks main-

tain their substantial rises. Mexican Light and Power Fives hardened to 79¾. Apart from this, the company's declaration of dividends on its first and second preference capital has failed to counteract the unfavourable effect produced by the mild revolution that lately occurred in Mexico, and which did not last long. It has served, however, to leave an unpleasant impression for the time being. Mexico Trams 5 per cent. firsts are down to 76, and the 6 per cent. seconds show a drop of 5 to 75.

London and Home Tramways.

London and Suburban Traction preference have reverted to 8s. 6d., the market in them being too slow for the speculator who bought them up to half-a-guinea, and then switched off on to something more volatile. The ordinary shares stick, at 3s. London United Tramways preference have not moved for a fortnight, and are still 8s. 6d. Hastings and District Electric Tramways ordinary were done last Friday at a shilling. The preference, which have not changed hands in the Stock Exchange for three months, are quoted 7s. 6d. to 10s. In Cape Electric Tramways a bargain was marked recently at 17s. 10¼d. British Electric Traction deferred was sold a few days ago at 485. The 8 per cent. preferred ordinary stock has been attracting a little business on the basis of 121.

Americans in the Tubes.

The Home railway market has shown a generally better tendency, which extended to the electric railway stocks, where good buying of Metropolitans lifted the price 3¼ points to 60. Districts followed at a more leisurely pace, and rose 2 to 63¼. Underground income bonds are unchanged, but the £1 shares at 19s. 6d. are 1s. better on the week. An interesting rumour came into Stock Exchange circulation to the effect that the American investor is buying British railway stocks. Possibly the report gained a readier ear by reason of the decision of the New York Stock Exchange to list a certain number of "foreign securities" upon its official market. There may be little more than intelligent anticipation in the report quoted, but, apart from the steam stocks, American investors have been known to take practical interest in some of London's Underground securities. In the early days of the later Tubes, and long before the coming of Lord Ashfield, the redoubtable Mr. Yerkes was a prominent personality, and capital was raised by Anglo-American finance for the construction of several constituent parts of the system now controlled by the Underground Electric Railways of London.

Marconi Improvements.

Marconis have been a good spot in the wireless group, their strength being mainly due to Signor Marconi's recent references to the commercial possibilities of the Beam system. He is reported to have predicted the rate of transmission by this means in the future at 2,000 words a minute, against the limit of 250 words per minute now in operation. The shares advanced to 27s., although the Official List price is 25s., at which they show a gain of 2s. 6d. Marines improved in sympathy to 30s. Canadians have held their last week's advance, and are a shade better at 7s. 4½d. Radio Corporations are 13¼, and the preferred 10 13/16. A lull has occurred in the rush to buy American and Canadian industrials, optimism having been damped by a fall in certain artificial silk shares that hail from across the Atlantic.

Cable Stocks.

Cable stocks, on the whole, have maintained their strength of last week, although changes in prices have been irregular. In the Eastern group, Eastern Extensions at 17⅜ x.d. are unchanged, allowing for the deduction of the dividend, but Eastern Telegraph stock at 174¼ x.d. shows a net fall of 10s. Westerns are unaltered at 17¾, while Globes put on ¼ at 17¼. The rare sight of the Eastern cable quartette standing at the same level of prices did not last for long. Great Northerns jumped 1 to 36. A prominent feature in the telephone section has been another advance in United River Plates, which lifted the price to 11 1/16, a rise of 11/16. It would appear as though the floating supply of available shares must be getting very limited. As the stock becomes absorbed, the effect of insatiable demand is, in consequence, the more marked.

Why Prices Rise.

This absorption of available stock and shares is a feature in several directions. Mention was made here last week of Scottish Power ordinary shares being on offer at 26s. They were taken on the day these notes appeared, and the price promptly advanced to 27s. 6d. The same sort of thing has happened in Brazilian Tractions, British Columbia Electric Railway deferred, Henley's, and Babcock & Wilcox. Economists may deplore the demand as being carried to unreasonable, if not to unreasoning, lengths, but the people who hold the securities affected are content with their investments, and, in company with the present-day buyers, they ignore the meagre yields obtainable at the current rates of dividend. Vickers are thought likely in some quarters to receive a dividend for the present year's working, and the iron and steel division is disposed to improve. There is even some little inquiry for good-class rubber shares in consequence of a slight rally in the price of the raw material.

Share List of Electrical Companies.

	Nom.	Dividend. 1925.	Dividend. 1926.	Price Oct. 17 1927.	Rise or fall.	Yield. p.c.
Home Electricity Companies.						
Bournemouth and Poole	£1	14	14	58/3	—	4 15 9
Brompton Ordinary	£1	10	8½	24/6	—	5 14 3
Charing Cross Ordinary	£1	15	8½	25/6	—	5 9 10
do. do. 4½ Pref.	£1	4½	4½	17/6	—	5 2 10
Chelsea	£1	12	8½	24/6	—	5 14 3
City of London	£1	15	7½	28/9	—	4 17 5
do. do. 6% Pref.	£1	6	6	22/6	—	5 6 8
Clyde Valley	£1	8	8	32/6	—	4 18 6
County of London	£1	15	7½	27/-	—	5 3 8
do. do. 6% Pref.	£1	6	6	22/6	—	5 6 8
Edmundson's Ordinary	£1	8	10	38/9	+1/8	5 3 3
do. 7% Pref.	£1	6	7	24/6	—	5 14 3
Elec. Supply Corporation	£1	10	10	32/6	—	6 3 0
Kensington Ordinary	£1	15	8	26/6	—	5 9 10
Lancs. Light and Power	£1	7½	7½	27/-	+6d.	5 11 1
London Electric	£1	10	8½	24/6	—	5 14 3
do. do. 6% Pref.	£1	6	6	5⅝	—	5 11 3
Metropolitan	£1	11	6	20/-	—	4 13 4
do. 4½% Pref.	£1	4½	4½	17/-	—	5 8 6
Midland Counties	£1	5½	6	23/-	+6d.	5 4 4
Newcastle-on-Tyne Ordinary	£1	7	5	22/-	—	4 11 0
do. 5% Pref.	£1	5	5	17/6	—	5 14 3
do. 7% Pref.	£1	7	7	25/-	—	5 12 0
Notting Hill 6% Pref.	£10	6	6	10⅝	—	5 11 7
North Met. Elec. 6% Pref.	£1	6	6	22/6	—	5 6 8
St. James' and Pall Mall	£5	17½	8	25/6	—	5 9 10
South London	£1	15	8½	25/-	—	5 12 0
South Metropolitan Pref.	£1	7	7	1¼	—	6 3 0
Urban Ordinary	£1	7	7	1 7/16	—	4 9 7
do. 6% Pref.	£1	6	6	1 5/16	—	5 18 0
Westminster Ordinary	£1	15	8½	25/-	—	5 12 0
Whitehall Elec. Invst. 7½% Pref.	£1	7½	7½	20/9	—	7 4 7
Yorkshire Elec.	£1	8	8	31/6	—	5 3 0
Home Rails.						
Central London Ord. Assented	Stock	4	4	70	—	5 14 4
Metropolitan	,,	5	5	60	+8½	5 0 0
do. District	,,	3½	3½	62½	+2	5 10 1
Underground Electric	£1	Nil	1½	19/6	+1/-	1 10 9
do. do. Income	Bonds	6	6	104	—	5 15 5
Telegraphs and Telephones.						
Anglo-Am. Tel. Pref.	Stock	6	6	10 1/32xd	+1¼	5 15 11
do. Def.	,,	1½	1½	25	-	6 0 0
Automatic Telephone	£1	8	10	28	- 1/8	4 4 3
Chili Telephone	£5	5	6	7⅞	—	3 18 3
Eastern Extension	£10	10	10	17 3/8xd	+⅛	*5 9 7
Eastern Tel. Ord.	Stock	10	10	174½xd	+½	*5 14 7
Globe Tel. and T. Ord.	£10	10	10	17⅞	+½	*5 11 11
do. do. Pref.	£10	6	6	10⅝	—	5 10 4
Great Northern Tel.	£10	20	20	36	+1	5 11 1
Indo-European	£5	8½	10	44½	—	*5 7 6
Marconi	£1	Nil	Nil	25/-	+2/6	.. ..
Marconi-Marine	£1	7½	8½	30/-	+1/3	5 16 8
Oriental Telephone Ord.	£10	12	12	52/6xd	+9d.	*4 9 4
United R. Plate Tel.	£5	8	8	11 1/16	+1/16	*3 12 4
Western Telegraph	£10	10	10	17½	—	*5 12 8
Home and Foreign Trams, &c.						
Anglo-Arg. Trams First Pref.	£5	5½	5½	8½	—	7 17 2
do. do. 2nd Pref.	£5	6	6	8 1/16	+1/16	8 8 6
do. do. 5% Deb.	Stock	5	5	73½	—	6 16 1
British Electric Traction Def. Ord.	,,	8	8	500	—	... ...
do. do. 8% Pref. Ord.	,,	8	8	120½	—	6 12 10
Brazil Traction	£100	5	5	215	+4	2 15 7
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	91½	+1	5 9 3
do. do. Preferred	,,	6½	6½	187½	—	4 10 11
do. do. Deferred	,,	8	8	184½	+1	*4 6 8
do. do. Deb.	,,	4½	4½	79½	—	5 6 11
London & Sub. Trac. 5% Pref.	£1	Nil	Nil	9/6	—6d.	Nil
London United Tram. Deb.	Stock	4	4	56½	—	7 1 7
Mexico Trams, 5% Bonds	—	5	5	76	—1/-	6 11 7
Mexican Light Common	£100	Nil	Nil	57	—½	Nil
do. Pref.	£100	Nil	Nil	77½	—	Nil
do. 1st Bonds	—	5	5	79½	+2	6 5 9
Yorkshire (West Riding)	£1	5	—	7/6	—	... ...
Manufacturing Companies.						
Babcock & Wilcox	£5	18	18	59/3	+3/-	4 7 6
British Aluminium Ord.	£1	12½	10	44/6	—1/3	4 9 11
British Elec. Transformer Pref.	£1	Nil	7	18/3	—	7 13 6
British Insulated Ord.	£1	15	15	8 1/2	+1/16	3 16 2
Brush Ord.	£1	10	10	28/9	+9d.	6 16 4
Callenders	£1	15	15	8 1/2	+1/16	3 18 6
do. 6½% Pref.	£1	6½	6½	23/9	—	5 9 6
Crompton Parkinson Pref. Ord.	£1	Nil	Nil	16/-	—	... ...
Edison-Swan	£/-	10	10	10/-	-	4 0 0
do. 5% Deb.	Stock	5	5	90	+2	5 11 1
Electric Construction	£1	10	7½	28/9	—	5 4 4
Enfield Cable Pref.	£1	7½	7½	25/-	—	6 0 0
English Electric	£1	Nil	Nil	10/-	—	... ...
do. do. Pref.	£1	8	—	13/-	—	... ...
Gen. Elec. Pref.	£1	6½	6½	23/6	—	5 10 8
do. Ord.	£1	7½	7½	33/-	+1	4 10 11
Henley	£1	20	25	6½	+⅛	4 13 0
do. 4½% Pref.	£5	4½	4½	4½	—	5 6 0
India-Rubber	£1	5	5	20/6	—	*4 17 7
Johnson & Phillips	£1	17½	12½	50/-	—	6 0 0
Met.-Vickers Ord.	£1	8	8	28/9	—	5 11 5
do. Pref.	£2	8	8	2 7/8	—	6 4 8
Siemens Ord.	£1	7	7½	33/6	—	4 9 6
Telegraph Construction	£2	10	12	29½		*4 1 7

* Dividends paid free of Income Tax.

Correspondence.

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession.

A Proposed Mains Engineers' Association.

I notice in your current issue a letter from Mr. J. H. C. Brooking, suggesting an Association for Mains Engineers. This suggestion appears to me to be an admirable one if the result would be the exchange of experience in the many details and problems of executive mains work—things which are very rarely, if at all, dealt with in the proceedings of the larger established bodies, and which by their nature cannot be included in text-books.

Would it not be well for Mr. Brooking to publish, in fuller detail, what he has in mind as to the functioning of such an Association as he suggests?

L. R. Lee.

Manchester, *October 12th*, 1927.

Mr. Brooking's proposal to have a Mains Engineers' Association is timely, as the whole question of mains is now entering a new phase. The questions of compensation for power factor, regulation, efficient use of mains, and methods of meeting the difficulties that arise from extra-high pressures will all require much work in the near future.

The "Meta" has shown the way in connection with meters, and a Mains Association should have even greater opportunities for useful work. Might I suggest that the matter should be taken up by the I.E.E., in order to establish a section under the I.E.E. for this work? It was intended by the late Mr. Wordingham that the I.E.E. should form sections of this kind, and the energetic Wireless Section has shown what can be done. Much of the rapid progress in wireless work to-day is undoubtedly due to the fact that the I.E.E. has given special attention to this, and there seems no reason to doubt that similar results will follow the establishing of a special section for mains work.

A further advantage of having the matter taken up by the I.E.E. would be that it would save the necessity for further subscriptions, an item which must strongly appeal to most people who have the privilege of belonging to the electrical industry.

C. Turnbull.

Electricity Works, North Shields.
October 13th, 1927.

Employment Problems.

Four years ago, during the general post of staffs, I fell out. During that interval I have taken any odd job, earning £5 where my friends have been getting £8. My knowledge of employers is extensive, and I am thinking of teaching "how to get a job" by post.

Using this knowledge, I fell in with the queue which was the short list for a cable berth advertised three months ago (£5 10s. a week). Before the gentleman who interviewed could get over the shock of seeing the uninvited man, he was reading my testimonials, and he said: "You know too much for the man I am looking for. Why, in three years you will want a better berth." The many retorts to this statement prevented me saying much, so I tried another tack: he owned that my experience was what he required if I had been younger. Later he made this statement:—"*I cannot help the troubles of power-house men who may be out of work through their station closing down.*" However, we parted in the usual friendly polite business way. One thing I know is that I have knowledge and personality for which I cannot get a commercial return through this four-years' break in the normal flow of my progress.

"Midget" is correct—we can train to be successful. I am more of a success than I was four years ago, but we must remember that success is only comparative, *i.e.*, a scholarship boy is very successful if he gets £5 a week where he would only be an errand boy without that scholarship, while a man who remains in a £5 job when he has every advantage to improve himself and does not continue to make the necessary effort for progress, is a failure. A nation is successful in inverse proportion to its paupers, not in proportion to its millionaires.

The life-story of the President of the Institution of Electrical Engineers is an inspiration to the rising man, only employers should remember that he was apprenticed, *i.e.*, he spent a few months in different departments of the same firm; yet a man who gets the same experience with different firms is looked on as a drifter. Further circumstances have compelled the President to fill several posts of national importance in the last few years; yet employers do not seem to realise that a man who has carried on without promotion in this difficult period is quite equal to a younger man who is in the first flush of the "I have finished my training—now for a good job" feeling.

The surprising interest the Review takes in the staffs of the industry, past, present and future, pulls me back to the view that it's a fine old world: so I await

"Some Day."

October 16th, 1927.

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1926.

12,502. "Manufacture of white lead by electrolysis." R. S. Carreras. May 17th, 1926. (277,723.)
14,278. "Electric switches." F. B. Cox. June 7th, 1926. (277,728.)
14,380. "Telemotor mechanism." H. H. Mactaggart and R. G. Scott. June 7th, 1926. (277,729.)
15,298. "Telephone systems." Siemens Bros. & Co., Ltd., and W. G. Patterson. June 17th, 1926. (277,735.)
15,349. "Telephonic apparatus." W. J. Rickets and L. H. Paddle. June 18th, 1926. (277,737.)
15,450. "Luminous electric-discharge tubes." J. Demoulin. June 18th, 1926. (277,739.)
15,522. "Telegraphic signal amplification." K. L. Wood and Eastern Telegraph Co., Ltd. June 19th, 1926. (Addition to 246,531.) (277,740.)
15,692. "Electric motors." British Thomson-Houston Co., Ltd., and A. A. Pollock. June 22nd, 1926. (277,745.)
15,838. "Electromagnetic devices." Siemens & Halske Akt. Ges. August 24th, 1925. (257,230.)
15,999. "Thermionic discharge tubes." M-O Valve Co., Ltd., and C. W. Stopford. June 25th, 1926. (277,754.)
16,071. "Telegraph transmitters." Telegraph Construction and Maintenance Co., Ltd., and J. Riddle. June 25th, 1926. (277,758.)
16,098. "Electrical transmission of pictures." O. Von Bronk. June 26th, 1926. (277,761.)
16,126. "Telephone transmitters." E. E. Rouse. June 26th, 1926. (277,763.)
18,273. "Headlights for motor-cars and the like." W. Parker. July 22nd, 1926. (277,776.)
18,841. "Automatic ignition timing devices." British Thomson-Houston Co., Ltd., L. Griffiths, and J. H. Pollard. July 28th, 1926. (277,781.)
19,304. "Method and apparatus of the combined radio and ultra-audible type for navigation purposes." C. L. Florisson and Soc. de Condensation et d'Applications Mécaniques. September 8th, 1925. (258,235.)
20,040. "Control of electric circuits." General Electric Co., Ltd., and G. R. Myers. August 13th, 1926. (277,787.)
21,337. "Key sets for telephone systems." Siemens Bros. & Co., Ltd., and H. E. Humphries. August 30th, 1926. (277,794.)
22,519. "Electric batteries." A. N. Hazelhurst. September 13th, 1926. (277,798.)
22,648. "Circuit arrangements for radio receiving systems." British Thomson-Houston Co., Ltd., and T. H. Kinman. September 14th, 1926. (Cognate application 3,014/27.) (277,799.)
24,841. "Cable for transmitting a wide frequency band free from disturbance." Felten & Guilleaume Carlswerk Akt. Ges. May 31st, 1926. (271,807.)
25,650. "Detecting an earth in a high-tension network." Akt. Ges. Brown, Boveri et Cie. October 14th, 1925. (Addition to 253,478.) (259,978.)
27,144. "Means for automatically cutting-off current from electric current consumers." Siemens-Schuckertwerke Ges. November 2nd, 1925. (260,618.)
28,049. "Lampholders for electric lamps." H. R. F. Harper and Dixonia, Ltd. November 8th, 1926. (277,829.)
29,043. "Lighting and ignition machines for use with internal-combustion engines." International General Electric Co., Inc. November 17th, 1925. (261,756.)
30,465. "Control of a circuit by a selector spindle positioned by a step by-step rotation." Siemens & Halske Akt. Ges. May 17th, 1926. (271,030.)
31,786. "Globe fittings for electric lamps." L. A. M. McGeoch. December 15th, 1926. (277,839.)
32,782. "Coil windings for dynamo-electric machines." British Thomson-Houston Co., Ltd. December 29th, 1925. (263,833.)
32,950. "Loud-speaker motor units." F. A. D. Andrea, Inc. September 11th, 1926. (277,282.)

1927.

567. "Synchronisation of carrier-wave signalling systems." A. Karolus. January 19th, 1926. (264,816.)
1,764. "Arrangement for the control of switches driven by electric motors." Akt. Ges. Brown, Boveri et Cie. January 25th, 1926. (264,856.)
3,472. "Electrical railway switch operating mechanism." C. Bachmann and R. Kraft (trading as Scheidt & Bachmann). February 12th, 1926. (265,962.)
3,602. "Dynamo-electric machines (generators, motors and rotary convertors)." P. H. Valla and E. G. Basset. April 21st, 1926. (265,858.)
3,904. "Means for preventing retro-active effects in audion amplifying circuits." G. A. Somersalo. February 11th, 1926. (265,900.)
4,274. "Motor-operated electric switches." D. Ronnberg and Allmanna Svenska Elektriska Aktiebolaget. February 15th, 1927. (277,860.)
4,650. "Generation of short electric waves." Dr. A. Esau. February 18th, 1926. (266,372.)
6,038. "High-tension electric cables." Compagnie Générale d'Electricité. April 19th, 1926. (269,492.)
8,164. "Means for keeping the degree of insulation of the oil of oil-filled electric apparatus continuously under observation." B. Kocsis. March 25th, 1926 (268,365.)
8,660. "Binocular or astatic inductances and transformers." E. L. Wildy and London Electric Wire Co. and Smiths, Ltd. March 29th, 1927. (277,876.)
9,532. "Acoutic diaphragms." L. Lumiere. May 31st, 1926. (Addition to 256,252.) (271,831.)
10,061. "Apparatus for the radiation of light for use in therapeutics." Quarzlampen-Ges. April 12th, 1926. (269,553.)
10,153. "Loud speakers." H. Schuth. April 13th, 1927. (277,886.)
12,109. "Transmission of telegraphic signals with continuous-wave transmitters." Nederlandsche Seintoestellen Fabrik. May 22nd, 1926. (271,447.)
13,036. "Circuit arrangement for modulating the oscillations generated by a thermionic device." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. May 22nd, 1926. (271,465.)
13,460. "Brakes for tramway, railway, and the like vehicles." J. A. Baker. May 19th, 1927. (276,931.)
13,544. "Electric dry cells and dry batteries and method of manufacturing same." Compagnie Française pour l'Exploitation des Procédés Thomson-Houston. May 19th, 1926. (271,496.)
13,595. "Automatic reclosing circuit-breaker systems." British Thomson-Houston Co., Ltd. May 22nd, 1926. (271,502.)
13,628. "Carbon microphones." T. B. Smith. May 20th, 1927. (277,908.)
13,702. "Electrical lighting appliance." H. F. Simon. May 21st, 1927. (276,932.)

Trade Mark Applications.

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from October 12th, 1927:—

Gramovox. No. 482,810. Class 8. Devices for use in connection with gramophones for converting mechanically reproduced vibrations into electrical impulses.—Igranic Electric Co., Ltd.

Regalite. No. 483,094. Class 18. Electric lighting and battery charging plants.—A. E. Morrison, Gartree Street, Leicester.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ALDERSHOT.—Schools and extensions (£65,000); for the borough E.C.; director of education.

ALTRINCHAM.—Club premises, for the British Legion Club; secretary. Block of 34 flats, for the U.D.C.; surveyor.

AUDENSHAW.—Warehouse, Manchester Road; F. Lloyd.

BARNET.—Nurses' home, extensions to hospital, &c. (£36,000), for the B.G.; S. Wilshire, clerk.

BARNOLDSWICK.—Church, for St. Joseph's; Rev. Father Theo Van Woerkom, Priest-in-charge.

BARNSLEY.—Technical and mining institute, Church Street; Education Committee.

BECKENHAM.—Quarters for firemen (£5,700), for the U.D.C.; surveyor.

BLACKPOOL.—Sunday schools and parish hall (£8,000), All Saints' church; vicar.

BOLTON.—Radiological department at infirmary; J. & N. Dickinson, builders, St. George's Road. Rebuilding premises, Bradshawgate and Byng Street; Holdens Carriage Co., Ltd. 28 houses, Stanley Road; W. Andrew.

BRADFORD.—Central motor garage, Canal Road; city architect.

BRISTOL.—Additional 35 houses, Henshaw Road and Fishponds, for the T.C.; borough engineer.

BROADSTAIRS.—Refuse destructor, St. Peter's, for the U.D.C.; surveyor.

CAMBORNE.—Bazaar premises, for F. W. Woolworth and Co., Ltd., Kingsway, London.

CHARD.—Infirmary (£8,000 to £10,000), for the B.G.; clerk.

CHELMSFORD.—Works depôt, Beehive Lane; Essex county surveyor.

CHESTERFIELD.—Extensions, Oldfield Pottery; James Pearson, Ltd. Machine shop, Sheepbridge Works; Sheepbridge Stokes Centrifugal Castings Co., Ltd.. 43 houses, St. Augustine's Estate; William Drabble & Sons.

CLEVEDON.—Additional housing scheme (40), for the U.D.C.; surveyor.

COLCHESTER.—Extensions, East Anglian Institute of Agriculture; Committee.

CONISBOROUGH.—Extensions to Crookhill Hall Institution, for West Riding C.C.; county architect, County Hall, Wakefield.

COVENTRY.—Conversion of Keresley Hall into convalescent hospital, for the Committee of Coventry and Warwickshire Hospital; secretary.

COWES (Isle of Wight).—Bus garage, Somerton, for the Vectis Bus Co. (Several thousand pounds.)

CRAYFORD.—Conversion of premises into town hall and council offices, for the U.D.C.; surveyor.

CREWE.—Housing scheme (90), for the T.C.; E. G. Timbrell, architect.

CROMPTON (Lancs.).—Additional 150 houses, for the U.D.C.; surveyor.

DEWSBURY.—New offices, &c., in Church Street, for Dewsbury and West Riding Permanent Benefit Building Society; Kirk, Sons & Ridgway, architects, Market Place. Retort house, gasworks (£18,000); borough gas engineer.

DORCHESTER.—Electricity supply new Grammar School; governors.

EASTBOURNE.—Re-erection of All Saints' Church; Rev. George M. Hanks, vicar, Grange Road.

ECCLES.—Joint hospital; Corporation, Stretford U.D.C., and other bodies. Fire station (£17,000), for the T.C.; borough surveyor.

ENFIELD LOCK.—New SS. Peter and Paul Church, Ordnance Road; W. J. Haward, builder, Hoddesdon.

ERITH.—Housing scheme (126), for the U.D.C.; Harold Hine, surveyor.

ETON.—Institution, for the B.G.; the clerk.

FARNHAM.—Additional housing scheme (75), for the U.D.C.; surveyor.

FLEETWOOD.—Dock extension scheme, for London, Midland and Scottish Railway.

FOLESHILL.—Additional 50 houses, Collycroft, for the R.D.C.; A. E. Newey, surveyor.

GLOSSOP.—Re-erection of portion of silk mill, electrically equipped, for E. Wilman & Co., Ltd., Station Mills, Hadfield.

GRAVESEND.—255 houses, King's Farm Estate; Corporation architect.

HARROGATE.—Improvements, Willow House Farm, Clifton, for Corporation; borough engineer.

HARTWOOD.—Nurses' Home, for Lanark District Board of Control; clerk, Hamilton.

HULL.—426 houses, Eastern and Western Estates; city architect. Extensions, Institute, Beverley Road; Blind Institution Committee.

ILKESTON.—Hosiery factory, Awsworth Road; A. Booth and Sons.

JARROW-ON-TYNE.—Police station and court house, for Durham C.C.; W. J. Merrett, county surveyor, 43, Old Elvet, Durham.

KELVEDON.—Church, Coggleshall; Rector of St. Mary Immaculate and the Holy Archangels.

KETTERING.—Housing scheme (124), for the U.D.C.; surveyor.

KNARESBOROUGH.—Extensions to King James Grammar School (£18,140), for the governors; secretary.

LEEDS.—Proposed aerodrome; Alan Cobham Aviation, Ltd. 32 houses, Parkside Estate, Dewsbury Road; A. Booth.

LINCOLN.—Showrooms and offices (£13,000), for the T.C.; William Wright & Son (Lincoln), Ltd., builders.

LONDON (Hackney, E.).—Two blocks of dwellings, Shore Estate; Rowley Bros., Ltd., Tottenham.

(West Ham, E.).—Greyhound racing track, for the West Ham Greyhound Racecourse, Ltd.; Littlejohn, Wilson, McKnight & Hill, 57, Bishopsgate, E.C.

(Westminster, S.W.).—Buildings, 9-10, North Audley Street and 1, Providence Court; J. S. Beard. Buildings, Hereford Gardens, Oxford Street, Park Street, and North Street; Boodle, Hatfield & Co. Rebuilding 37-38, Golden Square and 4-7, Upper James Street; G. Jeeves. Alterations, 3-5, Oxford Street; W. & E. A. Hunt.

LUTON (Beds.).—Greyhound racing track, Leagrave, for the London and Provincial Racing Co., Ltd.; A. E. Heley, chairman.

LYE.—Market hall; Hugh E. Folkes, architect, Stourbridge.

MALTBY (Yorks.).—Greyhound racing track; John E. Whitehead, architect, 34, Goddard Hall Road, Sheffield.

MANCHESTER.—Churches, Blackley and Withington; Bishop of Manchester.

MIDDLESBROUGH.—Extensions to the municipal buildings, with electric lift (£8,000), for the T.C.; borough surveyor.

NEWCHURCH (Lancs.).—Roman Catholic church (£9,000); Rev. Father M. Gill.

NEWPORT (Isle of Wight).—Factory, for Wadham & Sons.

NOTTINGHAM.—Covered market (£48,000), for the T.C.; city engineer.

OXFORD.—Workrooms, University Museum, South Parks Road; Prof. Soddy. Extensions, Somerville College, Woodstock Road; governors.

PARTINGTON.—Housing scheme (60), for Manchester T.C.; city surveyor.

PLYMOUTH.—Church and Sunday school, North Prospect; United Methodist Church trustees. X-ray block, Didworthy Sanatorium; Corporation architect.

PORTSMOUTH.—Workshops for blind, Portsdown Hill (£11,000); Howe & Bishop.

RAMSGATE.—Additional 104 houses, for the T.C.; borough engineer.

ROYTON.—Central school, High Barn Street, for Lancs. E.C.; county architect, Preston.

SCARBOROUGH.—Cinema (£45,000), for the Londesborough Theatre and Picture House (Scarborough), Ltd.

SHEFFIELD.—Housing scheme (135), Longley Estate; W. G. Davies, city architect, Town Hall.

SOUTHAMPTON.—Extensions to Royal South Hants Hospital; Gutteridge & Gutteridge, architects, 9, Portland Street.

STOCKPORT.—Additional housing scheme (136), for the T.C.; borough surveyor.

THORNBURY.—Housing scheme (40), for the R.D.C.; F. W. Davies, architect.

TONBRIDGE.—Refuse destructor, for the U.D.C.; surveyor.

TORQUAY.—Cinema, Hampton Estate, St. Marychurch, for Major A. O. Ellis. Houses (32), Newton Road, for Mr. French. Electric light installation Newton Road Isolation Hospital, for the T.C.; borough electrical engineer.

TOTNES.—Adaptation of Follaton premises for mental hospital; Plymouth borough architect.

WATFORD.—Proposed cinema or concert hall, Pond site; Matthew, Arnold & Weaver. Proposed potted meat factory, National School site; Mr. Weller. Artificial light centre, Little Nascot; Medical Officer of Health.

WELWYN GARDEN CITY (Herts.).—Factory, for the Artofex Engineering Works, Ltd., Pentonville Road, London.

WIGAN.—Cinema, dance hall, and restaurant for the Savoy Cinemas (Northern), Ltd. Reinstatement of works, electrically equipped, for Gallagher Bros., West End Chemical Works.